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ABSTRACT

Outdoor education has been a viable part of American education for the past 40 years. This book traces the development of outdoor education and is intended to address a variety of factors relating to the outdoor education programs that exist today. Chapter one, "Why Teach Outside the Classroom," contains sections which provide a rationale for the inclusion of outdoor education in the regular school curriculum. Chapter two, "Techniques of Teaching in the Outdoors," addresses the importance of the use of direct experiences and inquiry in outdoor laboratory settings, and includes several examples of teaching techniques. "Extending the School Curriculum to the Outdoors," chapter three, includes examples of learning activities in various subject areas that can be correlated with the objectives of the school curriculum. Chapter four, "Learning Experiences for Outdoor Laboratories," stresses that outdoor education can occur on the school site, and outlines several activities developed for that type of learning laboratory. Chapter five, "Resident Outdoor Education Programs," focuses on considerations related to programs involving overnight camping and the use of special resident facilities. Chapter six, "Evaluation Procedures in Outdoor Education," summarizes some ways to evaluate a program's effectiveness. The final chapter examines what research says about outdoor education. (TW)

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Teaching in the Outdoors

Third Edition

Teaching in the Outdoors

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To our students who are destined to become
the next generation of leaders
in outdoor education.

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Foreword

OVER 40 YEARS AGO, outdoor education emerged from its chrysalis and became a viable force on the American education scene. It was considered by many prominent educators, such as John Dewey and Earl Kelly, as education for reality and for dealing with real-life situations. It was considered important then, and it is even more important in our modern-day society. It is education that cannot wait, if young and old alike are to take an active role in shaping a quality environment for all forms of life. There has always been a definite need for ideas and teaching-learning techniques in the outdoors.

Teaching in the Outdoors was first published in 1964 and was dedicated to L. B. Sharp, noted pioneer in outdoor education. L. B. Sharp also wrote the foreword to this timely book. It represented a pragmatic approach to outdoor teaching and learning, and it was full of teaching aids and instructional ideas. It soon became a part of the working library of most practicing outdoor educators.

The book represented the many years of experience in outdoor education achieved by the authors. The authors did an excellent job of developing a rationale for outdoor education and demonstrated the relationship of outdoor education to the ongoing school curriculum. They wrote about effective teaching-learning techniques and procedures. The book also included implications for teacher preparation for outdoor education, as well as ideas for the organization and implementation of resident outdoor education programs.

In 1973, a second edition of *Teaching in the Outdoors* was published, and it expanded the first book. Now, 10 years later, a great many things have happened with regard to outdoor education. Innovative programs, such as adventure programs, stress-challenge, environmental encounters, high-risk education, values clarification, acclimatization, new games, cultural journalism (*Foxfire*), have appeared on the scene. The computer age of the eighties has prompted a revision of this time-tested book on outdoor education.

I have continually used this book in my classes since it first appeared in 1964. It has been received with high enthusiasm by both undergraduate and graduate students alike. It has been a helpful resource at various workshops and conferences in outdoor education.

It is a privilege to write this foreword, because I was an associate of L. B. Sharp for many years, and to be able to write a foreword to the same book, as he once did, is a distinct honor. Also, having crossed trails professionally with the authors over the years has been to my advantage, and to write a foreword to my colleagues' revered work is a signal honor.

THOMAS J. RILLO, Ph.D.
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Preface

OUTDOOR EDUCATION is now past the mid-century mark in the United States. Continued expansion of programs in elementary and secondary schools as well as in colleges and universities has created a demand for information dealing with (1) the underlying rationale for outdoor education, (2) effective techniques and procedures for teaching outdoors, (3) ways and means of extending the school curriculum to outdoor settings, (4) the scope of outdoor laboratories and instructional materials available, (5) resident outdoor education, (6) evaluative procedures, and (7) what research tells us about learning outdoors.

This book is designed especially for teachers-in-training, in-service teachers, school administrators, and college personnel. Organizational and private camp owners and directors will also find *Teaching in the Outdoors* useful as a source of program ideas. This text may also suggest the means for extending the use of summer camp facilities into the school year.

The scope of the materials presented here is by no means intended to be an exhaustive and exhausting coverage of the field of outdoor education. Rather, *Teaching in the Outdoors* is intended to present a brief, concise point of view representing our philosophy, derived from our collective personal experience as professional outdoor educators. The thoughts and information presented in this volume will, we trust, aid others in helping students and teachers alike to become better acquainted with "the strangeness of the familiar."

The third edition of *Teaching in the Outdoors* is a substantially revised and expanded version of a book first published by Burgess Publishing Company in 1964 and revised in 1973. We are pleased that the continued demand for this basic text in outdoor education has resulted in this publication with The Interstate Printers & Publishers, Inc.

Dr. Donald R. Hammerman continues to teach at Northern Illinois University's Lorado Taft Field Campus, where he has served as both an administrator and a professor since 1954. Dr. William M. Hammerman is a professor at San Francisco State University and a well known ECO educator in California. Dr. Elizabeth L. Hammerman is Director of Outdoor Education at White Pines Ranch in Oregon, Illinois, and teaches science education at Northern Illinois University. Together these three authors bring a total of 65 years of experience in outdoor education and teacher education to this publication.

DRH
WMH
ELH

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CHAPTER 1

Why Teach Outside the Classroom?

THE IDEA that learning can, and ought to, occur outside the classroom is by no means a new idea. Long before schools, text books, or professional educators ever existed, learning by direct experience was the customary means of passing on the essentials of human culture from one generation to the next. The gradual evolvement of camping education, which subsequently evolved into outdoor education, was influenced by various sociocultural factors, the first of which was philosophical. Elements of a philosophical basis for outdoor education, for example, can be found in the doctrines of Rousseau and Pestalozzi.[1]

Jean Jacques Rousseau (1712-1788) preached that healthful physical activity was of prime importance in a child's education. He asserted that the child's natural interests and curiosities should be used to the fullest. He advocated that education be less literary and linguistic and more sensory and rational. He believed that children should learn directly from experience rather than indirectly from books. "Our first teachers," Rousseau proclaimed, "are our feet, hands and our eyes. To substitute books for all these . . . is but to teach us to use the reason of others."

The Swiss educator Johann Heinrich Pestalozzi (1746-1827) made use of real objects and firsthand experience on his farm home school for boys and girls. Not only did Pestalozzi teach his students the usual three Rs but also the practical skills of farming, housekeeping, spinning, and weaving. It is interesting to note two modern corollaries in outdoor education. First, school farming, sometimes operated in conjunction with a school camp; and second, the emphasis placed upon housekeeping activities, in some outdoor schools, as a vehicle for teaching responsibility. Pestalozzi also taught geography and nature study in the schoolyard. His method of instruction was based on experiential learning, which students later combined to formulate principles and generalizations of their own.

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[1] Adolph E. Meyer. *The Development of Education in the Twentieth Century*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1956, p. 8.

The principles advocated by Rousseau, Pestalozzi, and others were, for the most part, simply basic to sound teaching. The applications of these principles, however, appear to lend themselves more readily to methods of learning outside the school than to indoor classroom procedures.

WHAT IS OUTDOOR EDUCATION?

Outdoor education is a contemporary curriculum development that is sometimes difficult to define. It is a rather vague and nebulous educational concept. As a methodology, or approach, to more efficient and effective learning, the term *outdoor education* has been applied in various ways. To illustrate:

- A group of summer vacationers in Yosemite National Park hiked across a terminal moraine and felt the slickness of glacial polish on a rock outcrop. The hikers asked questions about how the valley was formed and were guided to observe the effects of the succession of glaciers that once covered the area. *Outdoor education enhances science education.*
- A fifth-grade class in California started the new school year with a week of camping in the Sierra Nevada. The students fished, swam, hiked, cooked over an open fire, and slept under the stars. They made their own pack frames, constructed their own shelters, and learned to live comfortably in a wilderness environment. *Outdoor education enhances camping education.*
- Along a narrow path, beside a picturesque lake shore in

one of Indiana's many state parks, members of a seventh-grade class came upon some strange animal tracks leading from the water's edge to a nearby hole in the ground. The boys and girls made field sketches of the tracks and of the entrance to the animal home and made several plaster casts of the tracks. The hikers then returned to the library at the outdoor center to check their findings. They came to the tentative conclusion that the tracks were made by a raccoon. Still not entirely positive of their identification, they rigged up a self-tripping camera with flash attachment at the entrance hole. The next morning, upon finding the trip sprung, they developed the film and confirmed their "educated guess"—the animal was indeed a raccoon. *Outdoor education enhances nature study.*

- A group of in-service teachers attended a summer workshop in which they "encountered" their environment through direct experiences in outdoor settings. One of the desired outcomes of the program was to assist the teachers to recognize and clarify the values, attitudes, and concepts necessary to understand and appreciate the interrelatedness among humankind, their culture, and their biophysical environment. In addition, these experiences were designed to provide them with the understandings and skills needed to contribute rationally to the decision-making process on issues involving the quality of the environment. *Outdoor education enhances environmental education.*
- Ms. Green was introducing a social studies unit on "New World Explorers" to her sixth-grade class. During a discussion of navigational tools, she discovered that many children did not know *how* or *why* a magnetic compass worked. For the science lesson that day, Ms. Green thought it wise for students to work with magnets to discover just how a magnetized object will eventually swing to a north-south alignment. Before the session was over, the youngsters had experimented enough to know about the magnetic field of force and the laws of attraction and repulsion. During the math period, Ms. Green introduced the idea of a circle with degrees marked off, which, when placed beneath a freely swinging magnetized needle, be-

> comes a compass. To reinforce the principle of a magnetic compass and to provide actual experience in using it as a directional tool, compasses were distributed, and the class was taken out on the playground to determine the azimuths to various landmarks and to locate prescribed directions, such as east, southeast, and 280°. It soon became apparent to the children that before a designated spot could be located, another factor—distance—had to be known. After some firsthand acquaintance with surveyors' tapes, the students learned how to determine the length of their individual pace and were able to use this calculation in estimating distance.
>
> The culminating activity for the unit on "New World Explorers" was a modern-day exploration in a nearby city park. The boys and girls organized themselves into teams of three or four for the purpose of determining compass directions and distances for mapping the area. Once these field data were collected and recorded, the students constructed a map of the park area, complete with legend, scale, north arrow, and declination. In order to check the accuracy of their field exercise, they invited the city park manager to visit their class and to bring along one of the city's official maps of the park for comparison purposes. *Outdoor education encompasses a variety of curricular areas.*

Outdoor education obviously can be interpreted in different ways, depending upon one's perspective. Conservationists, for example, may perceive outdoor education as relating primarily to the wise use of natural resources. Their chief concern is that of educating the public to the values of soil, water, forest, and wildlife resources and their wise management. Recreation leaders, on the other hand, may view outdoor education mainly as a means for realizing the joys of recreational pursuits in the great outdoors. Their approach is one of educating youth to the ways of camping, fishing, boating, skiing, and so on. These outdoor recreational skills have great carry-over value for the adult years, at which time people have real need for health-promoting pursuits. Environmentalists may see outdoor education as one means of assisting each student in developing an attitude of personal responsibility for our finite and fragile environment. A general goal of environmental education is to show that conditions created by humankind, through social, economic, and technological systems, have the proven capability for drastically altering the delicate biological community and the natural resources upon which life depends. Classroom teachers may consider outdoor education from still another viewpoint. Literally interpreted, the term *outdoor education* means simply "education which takes place in the outdoors." For our purposes, outdoor education may be defined as "using the outdoors as a laboratory for learning."

Expanding upon this definition, we should recognize that outdoor education is an approach toward achieving the goals and objectives of the curriculum, which involve (1) an extension of the classroom to an outdoor laboratory; (2) a series of direct experiences in any or all phases of the curriculum involving natural materials and living situations, which increase awareness of the environment and of life; and (3) a program that involves students, teachers, and outdoor education resource people in planning and working together to develop an optimum teaching-learning climate.

A BIT OF HISTORICAL BACKGROUND

During the years immediately preceding, and immediately following, World War II, when tensions and pressures, frustration, and anxiety were prevalent, it was of vital importance that the school, as a societal institution, find the means for providing the basic ingredients that make for emotional stability and well-being. Many of the psychosomatic ailments which plague modern society might be alleviated, if a closer bond to the more basic elements in life could be established. Edward L. Thorndike once indicated that humans need to see themselves in relation to the universe. Thorndike also expressed the view that knowledge of some of the ". . . great truths about . . . the continuity of living forms . . . [is] valuable for the conduct of life. . . . Every addition [science] makes to its catalog of Nature's changeless habits helps Man to change Nature including himself."[2]

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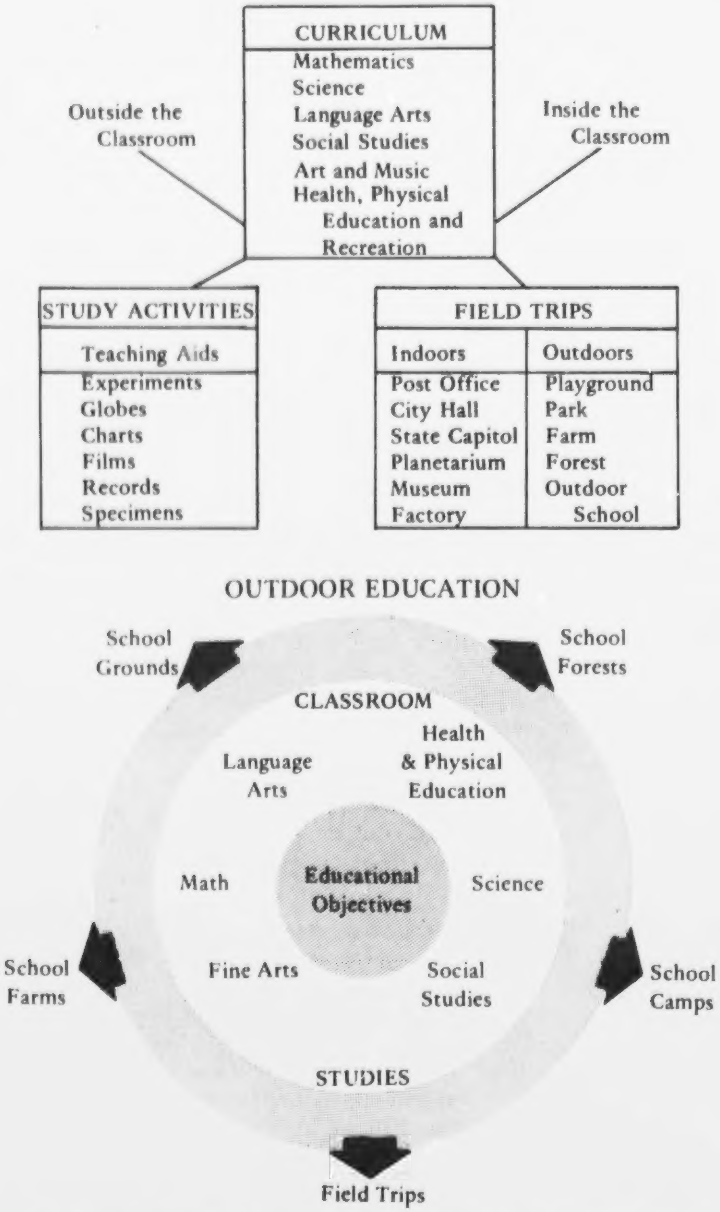
[2] Edward L. Thorndike. *Human Nature and the Social Order.* New York: Macmillan Publishing Co., Inc., 1940, p. 400.


CURRICULUM
Mathematics
Science
Language Arts
Social Studies
Art and Music
Health, Physical Education and Recreation
Outside the Classroom
Inside the Classroom
STUDY ACTIVITIES
Teaching Aids
Experiments
Globes
Charts
Films
Records
Specimens
FIELD TRIPS
Indoors
Post Office
City Hall
State Capitol
Planetarium
Museum
Factory
Outdoors
Playground
Park
Farm
Forest
Outdoor School
OUTDOOR EDUCATION
School Grounds
School Forests
CLASSROOM
Language Arts
Health & Physical Education
Math
Educational Objectives
Science
Fine Arts
Social Studies
School Farms
School Camps
STUDIES
Field Trips

This diagram illustrates the relationship between outdoor education laboratories, the school curriculum, and educational objectives.

Economic Factors That Influenced the Development of Outdoor Education

From 1930 to 1960, the United States experienced two major economic upheavals. The first, a depression of such magnitude that it affected practically all levels of society. The second, a world war, which, while serving to strengthen the economy, created social problems that contributed to the need for what was initially termed *camping education*, then *school camping*, and is presently labelled *resident outdoor education*.

During the Great Depression, millions of children were undernourished. Countless numbers lived in highly congested slum areas; in cramped quarters; and in neighborhoods lacking playgrounds, parks, and sunshine.[3] One of the selling points of early school camping was that the outdoor environment provided healthful outdoor living in the fresh air and sunshine.

The depression indirectly led to a reappraisal of the objectives of education. As more school systems and state departments of education turned their attention to the problem of revising curricula, new programs of instructional experimentation developed. The evolvement of camping education, or outdoor education, was one such development.

The droughts of 1934 and 1936 brought to light, in devastating fashion, the need for sound soil conservation measures. Fifty million acres of once productive land had been destroyed by wind and water erosion. About 75 percent of the productive land was subject to soil erosion and therefore threatened with destruction, unless preventative measures were implemented. Much of the same situation existed with regard to forests, minerals, and wildlife.[4] As the population of the United States expanded in the postdepression era, the need for greater effort to be put forth in the cause of conservation became readily apparent. A lack of vital, natural resources could seriously affect the entire American economy. The pressing need for conservation education was another contributing factor to the eventual development of outdoor education programs in schools.

Following World War II, Americans once again achieved a high standard of living. The shortened work week and longer weekends provided the working class with increased amounts of leisure. During the postwar period, many people turned to the hypnotic glare of their television screens to fill some of the newfound "empty hours." Countless others, on the other hand, flocked to the outdoors for recreation. In recent years, family camping has grown tremendously. An examination of any of several outdoor supply catalogs will reveal a varied assortment of camping equipment, ranging from tents to sleeping bags to the latest propane lanterns and camp stoves. State and national parks overflow with campers each summer. In fact, at some of the more popular camp grounds, it is necessary to make advance reservations in order to be sure of camping space.

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[3] George S. Counts. *The Social Foundations of Education.* New York: Charles Scribner's Sons, 1939, p. 518.

[4] William B. Ragan. *Modern Elementary Curriculum.* New York: Henry Holt & Co., 1960, p. 64.

During the thirties, the Civilian Conservation Corps (CCC) established camping facilities in state and national parks and created a general awareness of the need for conservation education. The educational program of the CCC demonstrated that education and life could be merged into one creative experience in a camp environment, thus paving the way for outdoor education.

Educational Influences

One characteristic of the *child-centered school,* which had direct bearing upon the development of outdoor education in our schools, was referred to by Harold Rugg as "orienting activities." In Rugg's own words, orienting activities consist of ". . . visits to field, farm and woods," that provide the learner with "concrete acquaintance with the physical world, and the world of plants and animals. At the same time, he is developing attitudes toward other people, toward things growing, toward all that constitutes his immediate world."[5]

A second influence was that of the *community school.* This trend, which first appeared in the early thirties, was directed toward the notion of a community-centered school in which the content of education would be found in the manifold experiences and activities of the local community. The school thus became the agency through which community involvement would take place.

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[5] Harold Rugg. *Culture & Education in America.* New York: Harcourt, Brace & Co., 1931, p. 346.

Book learning would be supplemented by means of firsthand investigations of community life. The social role of the school was stressed, and much importance was placed upon integrating school activities with actual needs and problems of the community.

The school ventured out into the community, and the community, in turn, became an integral part of the total learning environment. Schools were used as agencies to improve the life of the community. The community became a literal extension of the school plant. Students and teachers moved out from the schoolroom, into the community classroom and back again, as the needs and nature of their studies dictated. Thus, the community school concept was another of the foundations upon which outdoor education was constructed.

In summary then, we may conclude that the United States, aided by scientific and technological advances during the past century, progressed through an agricultural and industrial revolution. This transformation was accompanied by profound social and economic changes. During the thirties and forties, the American principles of freedom, equality, and self-government were faced with powerful challenges from totalitarian ideologies. It fell to the educational establishment to assume the task of trying to strengthen these democratic values. School camps, for example, were touted by their advocates as laboratories for democratic living, where the youth of the nation could practice democracy in action. L. B. Sharp phrased the plea for outdoor education and school camping as follows:

> No school is too small, too poor, or too poorly equipped to start, on the next school day, exploration just outside the school building, carrying it as far as transportation will permit, and no school or university is so well-equipped or so advanced in its learning that it cannot profit by exploration at home and abroad. But for young people to live most abundantly and democratically in a community of their own, each school must be equipped with a good camp as well as with library, gymnasium, laboratory and other facilities.[6]

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[6] Viola L. Stevens. "Promoting Out-of-the-Classroom Education and Camping in the Cleveland Heights Schools Through Organized Planning and an Experimental Two-Week Camping Experience for Children of a Fourth-Grade Class." *National Camp Problems*. New York: Life Camps, Inc., 1947, p. 92.

WHAT BASIC NEEDS ARE MET THROUGH OUTDOOR EDUCATION?

The Need for Effective Learning

Outdoor education is basically an approach to enhance learning. One purpose of outdoor education is to complement content areas of the school curriculum by means of firsthand observation and direct experience outside the classroom. Learning, which traditionally has been limited to the four walls of the classroom, is, for the most part, highly verbal. Thus we have youngsters memorizing passages from books—mouthing words without understanding the meaning of those words. Limiting learning to the classroom encourages the perpetuation of meaningless verbiage with no basis in experience. Extending the learning process into instructional settings beyond the classroom provides the opportunity for bringing greater understanding, deeper insight, and clearer meaning to those areas of knowledge which, all too often, are merely read and discussed, but which are seldom experienced.

The Need for Basic Concepts

Concepts are tools for thinking. They enable us to think in terms of abstract ideas *(truth, freedom, democracy)* and class groupings, that is, a robin is a bird, a bee is an insect, etc. The ability to conceptualize also enables us to formulate a universally accepted idea of something concrete, which we experience directly in everyday living. For example, almost everyone has some idea of "tree," "bird," and "river," depending upon a personal tree, bird, or river experience.

During the middle childhood period (6 to 12 years), most individuals form several thousand concepts. All too often, concepts learned in school at the verbal level are merely words without meaning. Students learn very quickly that the right words, in the right place and at the right time, will be more than adequate to satisfy the teacher. Whether or not youngsters actually understand what they are saying frequently goes undetected, since the ability to use a word correctly is accepted as evidence that learning has, in fact, taken place. Outdoor education provides teachers with a vehicle for bringing real meaning to what were abstract concepts. Those students who go out into the schoolyard or to a

Concepts are formed through direct experience.

nearby park to collect a soil sample, then test it and analyze the results will have a far different concept of soil than those students who merely read about soil in their geography texts and then still regard it as plain, ordinary "dirt."

The Need for Realism in Education

Lord Chesterfield once advised his son, who was away at school at the time, that "The knowledge of the world can only be acquired in the world, and not in a closet. Books alone will never teach you, but they will suggest many things to your observation." Effective teachers use all of the instructional resources at their disposal. These include the resources to be found in and around every community, as well as the usual school resources.

There is no more highly stimulating setting than the outdoor classroom. This classroom is equipped with expandable walls that extend as far as the learners' legs want to carry them. The floor varies from locale to locale—sometimes rock or water and sometimes field or forest. Its ceiling, too, is varied with ever changing cloud shapes, or at night with a myriad of star patterns beckoning to be explored. No school has ever contained the books, maps, or charts to ***rival the vividness of the real world.***

Lessons of life are to be found at every hand in the outdoor classroom. Students don't need to rely on words alone—symbols of reality—when they can see, touch, taste, smell, and hear "living lessons" that change with the seasons. Real understanding comes through doing, or experiencing. Children who have the opportunity to experience firsthand usually learn more rapidly. Fur-

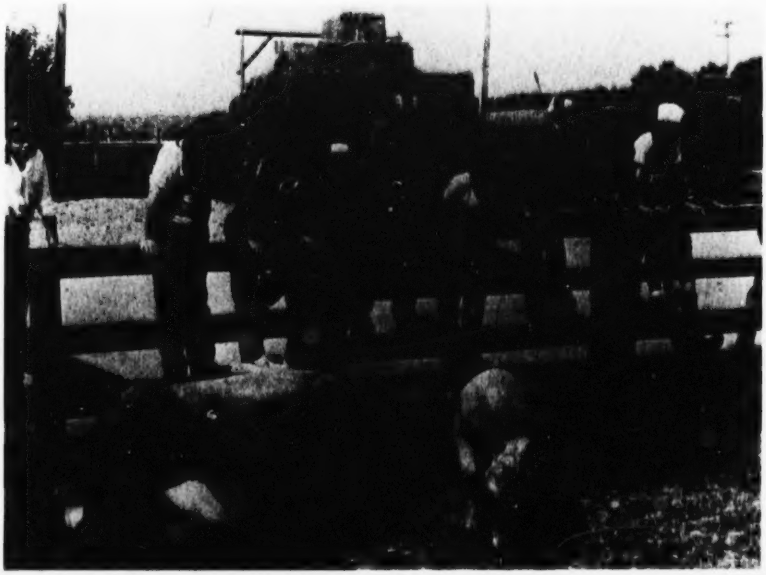
There is no substitute for firsthand observation.

thermore, knowledge which is learned in this fashion is ordinarily retained far longer than that which is merely read about. Knowledge of the world in which we live cannot, as Chesterfield implied, be gained solely within the four walls of the classroom, no matter how expert the instructor or how comprehensive the curriculum.

A basic tenet of outdoor education stated by L. B. Sharp is "Teach outdoors that which can best be taught outdoors, and teach indoors that which can best be taught indoors." Educators all too frequently tend to transport subject matter out of its natural environment to the rather artificial confines of the classroom. Teaching out of context in this fashion invariably brings a certain amount of sterility to the learning process.

The Need for Awareness

There is a vital need, especially among the youth of today's urban culture, to develop an awareness of the natural wonders of



Urban youngsters gain new insights of rural life.

this amazing world. Modern youngsters are missing a basic aspect of their own existence—acquaintance with the earth upon which we live and depend for our livelihood and survival. In this supermarket era, particularly, children ought to be aware of the sources from which we secure our food, and furthermore, they should understand the natural forces upon which we depend for our needs and their influence upon the economy.

The advent of television has served to bring worldwide marvels directly into our homes; yet today's youth are largely ignorant of many of the earth's mysteries and of the inhabitants that live, reproduce, and die in their own backyards, literally beneath their feet. A fascinating tableau of life in varied form, from birth to struggle for survival to ultimate death, is taking place in many backyards every day of the year. How many ever take time to observe this never ceasing drama? How many travel the exact same route to school or to work each day and yet are completely unfamiliar with, and for that matter unaware of, natural phenomena (trees, birds nesting, flowers, insect life) along the way? One of the greatest contributions outdoor education can make to this generation is to re-establish the fast-disappearing bond between humankind and the natural environment.

The Need for Appreciation of the Natural Environment

We exist basically in a materialistic society. In spite of periodic recessions, our inflationary economy has led to spiralling incomes. Despite corresponding spiralling costs, many Americans find themselves with the economic means to have several cars, a T.V. set, a stereo, a snowmobile or two (for those who live in the North country), a boat, a video tape player, a microcomputer, a vacation home, a golf club membership, a tennis club membership, and on and on. Because so much of our lives centers around the acquisition and use of material objects, there is a need to counterbalance this devotion to "things" with the inner renewal that can be derived through enjoying the simpler things in life.

However one wants to view it—call it gaining tranquillity, finding inner peace, seeing things in perspective—learning to appreciate beauty, along with the intricacies and inner workings of the natural environment, does tend to bring things into proper perspective, minimize personal problems, and meet some of the basic human needs.

The Need for Environmental Literacy

Seldom has a movement become a universal *cause célèbre* more rapidly than the concern for environmental quality. We pollute our water, our air, and our food, with the result that we pollute ourselves. We have had to grapple with the multiple and complex problems of an energy shortage. Finding solutions to these problems, locating alternative sources of energy, and devising means to utilize our present energy resources more efficiently continue to be top priority.

The following definition was accepted at the International Working Meeting on Environmental Education in the School Curriculum held in conjunction with UNESCO's International Education Year in cooperation with UNESCO and the Foresta Institute for Ocean and Mountain Studies at Carson City, Nevada, June 20 to July 10, 1970.

> Environmental Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-information of a code of behavior about issues concerning environmental quality.[7]

Human survival may well depend upon our ability to control the pollutants with which we despoil the land. Rivers, lakes, and streams are dying. Air is not fit to breathe. Humankind multiplies to the point where many cities are no longer habitable. Despite cleanup campaigns, Earth Day, and environmental councils, degradation of the environment continues virtually unabated. The environment, as it is presently constituted, is fit neither for humankind nor for living.

Emission controls on automobiles will help, as will industrial smog controls, zero population growth, and urban planning. All are needed, if the human race is to survive. The implications for education are clear. Former Senator Gaylord Nelson of Wisconsin advocated establishing environmental education programs that will make the environment, including man's relationship to it, a major subject at every level of public education. What could possibly be more vital than to have students confronting, and grappling with, real problems, rather than irrelevant, out-of-date, out-of-context exercises, which comprise so many textbook assignments.

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[7] This definition was developed by B. Ray Horn, at the time, a member of the Department of Outdoor Teacher Education, Northern Illinois University.

Many institutions of higher education responded to the environmental crisis in the traditional manner by developing some nontraditional courses; for example, Man, Nature, and Society; Urban Ecology; Biology and Human Affairs, History of Environmental Perception; The Social Impact of the Biological Scientist. Courses of study, conclaves, and conventions, in the main, attract only those who are strongly motivated to begin with. Legislation can prescribe rules and regulations to prevent gross misuse of the environment. Schools, as societal institutions, however, are in the prime position to ultimately influence behavior, change attitudes, and develop guidelines and principles that will affect the masses. Learning activities in the outdoors (which include urban as well as rural environments) designed to develop greater insight and understanding of ecological relationships and appreciation of humankind's responsibility for the quality of the environment should be a part of the fabric from which new curricula are designed.

The Need for Recreative Experience

Technological advances in the decades ahead will create a society in which computers will perform many of the functions presently being carried out by the work force. A 30-hour work week will be the norm, thus leaving the American worker with a far greater number of "empty hours" than any worker has ever encountered before. Some will fill their newfound leisure with additional sedentary indoor activity. But this needn't be the case. Increased leisure can provide the "vital hours" of one's existence—hours to be devoted to recreative activity, which enriches and fulfills life.

We are in the midst of a fitness and health binge. Witness the growth of running, cross-country skiing, and backpacking. Outdoor activity can be a major contributing force toward improved physical fitness and better health. The pressing need for wise use of leisure can be met, in part, through outdoor recreational pursuits such as hiking, climbing, biking, swimming, canoeing, skiing, and camping, to mention but a few.

VALUES OF OUTDOOR EDUCATION

Out-of-classroom learning has a way of contributing to numerous gains, some of which defy measurement in terms of producing visible, tangible results. Among the list of intangible gains is the improved relationship that invariably develops between teachers and students. In the freer atmosphere of the outdoor laboratory, unrestricted by the usual classroom formalities, children frequently view their teacher for the first time as an honest-to-goodness human being. Outdoor learning environments, likewise, provide a setting which enables teachers to observe students in a variety of circumstances in which they would not ordinarily see them. Under these conditions, a different sort of child-teacher relationship is bound to be established. In an era when the need for healthier human relationships between young and old and among people of all races, creeds, and colors is paramount, the humanistic values derived from out-of-classroom learning situations cannot be overlooked.

Another prime value of out-of-classroom learning is that teachers and students have larger blocks of time, without the usual "in-

Children and teachers relate in different ways in the outdoor classroom.

school" interruptions, such as bells ringing and classes changing, to come to grips with subject matter in some depth. Outdoor laboratories provide what may constitute almost the ideal academic climate—free of the usual interruptions and providing learners the opportunity for intensive/extensive investigations.

The essence of learning in these real-life situations is through problem solving, a process infrequently used in many classrooms. This is the way that most of us learn when we are not in school. Briefly stated, this process finds the learner, as problem solver, becoming involved in purposeful planning. The learner, rather than the teacher, establishes a worthy goal. The learner devises a plan for achieving that goal. The learner or learners, either individually or collectively, try out a plan. If it doesn't work, a revision, or modification, of the plan is required, and successive trials should be made, until the desired goal is reached.

Teachers expend a great deal of time and energy on trying to *cover* the subject matter when, perhaps, they ought to be devoting more time and attention to *uncovering* the material being studied. Of what benefit is it to finish the text or complete the unit of study if, in the meantime, the material has been presented so that the learner has little understanding of what has been covered? Problem solving enables the learner to struggle with basic concepts fundamental to real understanding of subject matter content. Direct experiences in the larger community beyond the school can enhance subject matter, which has merely been *covered* in school, and make it more meaningful.

Another missing element in many schools today is the sheer joy of discovery. The classroom, when extended into the outdoors, provides the setting in which students may enjoy the pure thrill of discovery, along with the plain, down-to-earth fun of learning. Learners are able to experience for themselves some of the same processes through which some of humankind's most significant discoveries of science, aesthetics, and self have been made.

Another tangible result that teachers frequently observe occurring in the outdoor classroom is an increased interest in "what-is-in-the book." After having captured an insect, having found a rock specimen, or, after much searching, having located a single constellation in the night sky, students are often motivated to turn eagerly and voluntarily to textbooks in order to learn more about their discoveries. The quest for the *what*, the *how*, and the

Searching for fossils can be challenging and fun.

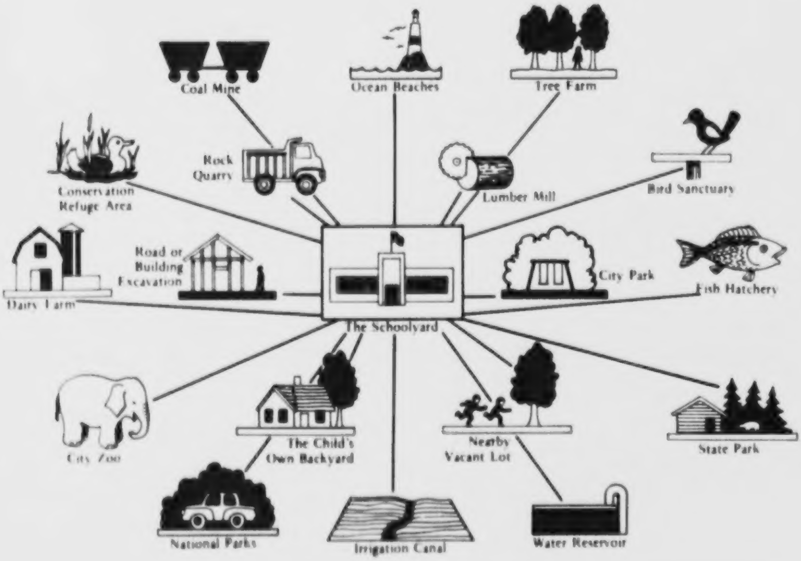
why of the world's mysteries can be an exciting adventure in learning. As G. K. Chesterton once pointed out, "The world will never starve for want of wonders, but only for want of wonder."

WHERE CAN OUTDOOR EDUCATION TAKE PLACE?

The outdoors abounds with areas appropriate for extending the classroom. Beginning just beyond the schoolhouse door and extending for miles in all directions, these unique learning laboratories have no equal. The schoolyard itself, whether covered with trees, shrubbery, and grass or blacktopped and containing playground equipment, is available for activities lasting from a few minutes to one hour or more. Learning experiences of longer duration may be conducted at a nearby park, zoo, or bird sanctuary. With a little exploration, many potential outdoor teaching sites can be located inside the city limits or within a few miles of most communities. A great deal of valuable learning can occur in the

The school site provides easy access for hands-on activity.

midst of the hustle and bustle of a city's business district. That, too, is a very real part of our natural environment. In fact, it is probably the environment where most of us spend most of our lives and, therefore, one with which we should become familiar.


Coal Mine
Ocean Beaches
Tree Farm
Rock Quarry
Conservation Refuge Area
Lumber Mill
Bird Sanctuary
Road or Building Excavation
Dairy Farm
The Schoolyard
City Park
Fish Hatchery
City Zoo
The Child's Own Backyard
Nearby Vacant Lot
State Park
National Parks
Irrigation Canal
Water Reservoir

Using various types of outdoor learning laboratories depends, to some extent, on one's geographical location and on the educational objectives desired. Field trips may be conducted with one major objective in mind or with several goals encompassing various disciplines. The outdoor-study activity may last from a few minutes to an hour or more, from a half day to one full day, or from two days to a week or longer. Extended field experiences ordinarily take place at a resident outdoor education center.

SUMMARY

The nature and complexity of modern society prevent contemporary education from confining itself to the classroom. The reasons for this are multiple and complex in themselves. First, technological advances in transportation and in the communications media have considerably enlarged the scope of the instructional environment.

Second, the American public school, as a societal institution, is charged with providing students with the knowledge and skills that will enable them to function effectively in their environment. The increased amount of leisure available today has broadened the scope of education's responsibility for meeting this need. The outdoors constitutes a huge, natural resource for recreation and leisure. Schools must now search for ways to educate for the optimum use of this resource.

Third, content that is removed from its natural setting tends to become sterile and unrealistic.

Fourth, if education is life, it cannot be isolated from the setting where living takes place. The dualisms of school and society and the school in the community cannot be separated. They are interrelated—fused together in an inseparable bond.

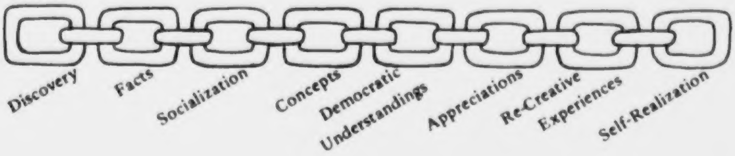
Fifth, as society has become increasingly complex, the school has broadened its objectives and expanded its functions. For these reasons, the horizons of the public school classroom have expanded and must continue to stretch, if the needs of society are to be met.

Last, the functions of a societal institution are, in part, dependent upon the needs of that society which it serves. As the needs-structure of society changes, so must the function of its institutions change. Outdoor education serves as an example of the manner in which a social institution adjusts its own goals and functions to keep pace with the changing times. The institution, likewise, has an obligation to perpetuate the desirable features of the social order. School camping, or resident outdoor education, was the embodiment of education's task to preserve and promote the democratic ideology.

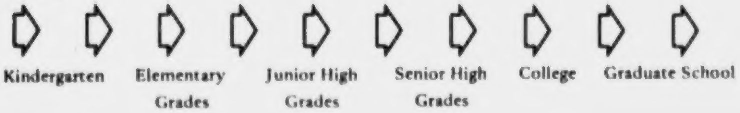
No amount of technological progress can restore disappearing wilderness areas with their natural wonders. Such areas are an elemental source of strength for modern society. Modern education cannot afford to lose these outdoor laboratories for learning; nor can modern education afford to ignore learning about the outdoors, in the outdoors, as a fundamental aspect of the American heritage.

The concept of extending the classroom beyond the school building provides the instructional setting in which educators with vision and imagination may improve the calibre of instruction by making more meaningful, through direct experience and firsthand observation outdoors, that which is taught indoors. The major themes of this chapter, "Why Teach Outside the Classroom?" may be depicted in the following manner.

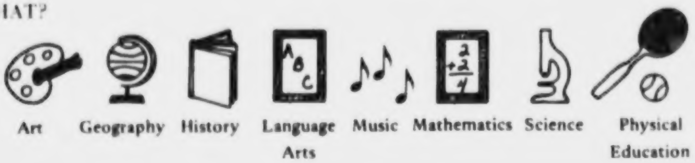
WHY?


Discovery
Facts
Socialization
Concepts
Democratic Understandings
Appreciations
Re-Creative Experiences
Self-Realization

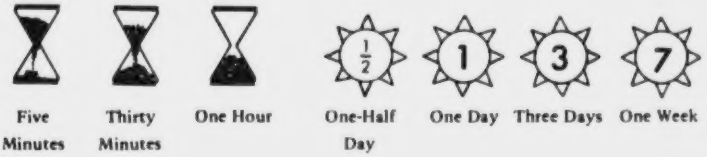
WHO?


Kindergarten
Elementary Grades
Junior High Grades
Senior High Grades
College
Graduate School

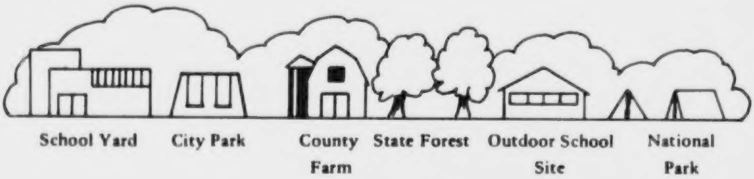
WHAT?


Art
Geography
History
Language Arts
Music
Mathematics
Science
Physical Education

WHEN?


Five Minutes
Thirty Minutes
One Hour
One-Half Day
One Day
Three Days
One Week

WHERE?


School Yard
City Park
County Farm
State Forest
Outdoor School Site
National Park

SUGGESTED READINGS

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CHAPTER 2

Techniques of Teaching in the Outdoors

WHAT IS THERE about the outdoor education approach that lends itself to learning about the environment? First of all, it is simply a common-sense approach to education. It makes a great deal of sense to carry on the business of learning in an instructional setting, where that which is being studied can make the greatest impact on the learner. A firsthand confrontation with subject matter exposes learners to an assortment of sensory and perceptual stimuli, from which they may formulate more complete concepts and derive fuller understanding so that prior knowledge is continually being refined and reconstructed.

A second element of out-of-classroom study is the opportunity for inquiry, as it relates to problem solving. Inquiry is the act of searching out data, usually through a process of first questioning and then investigating. Discovery occurs when the investigator/learner gains insight or knowledge of something previously unrecognized or unknown. The two processes, inquiry and discovery, work hand-in-hand in moving toward problem solving—an ingredient highly essential to the study and understanding of environmental problems. Inquiry leads to discovery. Discovery promotes insight. Insight provides understanding. Understanding contributes to knowledge—answers—and answers, in turn, lead to more questions—inquiry. So we swing full circle. There is at the same time closure, or an ending, in terms of having found some answers, and a beginning, in terms of recognizing new problems.

A third basic element of out-of-classroom instruction is simply that extending the instructional setting beyond the school places the learners in an environment where they may respond with their total being—mind, body, and spirit. Bombarded with multiple-sensory stimuli not ordinarily found in the classroom, the learners respond with motion and emotion—with thought and with feeling—and in ways known only to themselves that are of the highest value to an emerging, developing self.

A teaching strategy which is virtually synonymous with outdoor education is the "exploratory," or "discovery," approach to learning. The essence of this teaching procedure is the systematic use of questioning to provoke thoughtful observation and reaction on the part of the learner. Socrates employed this technique most effectively.

Learners are led to explore unfamiliar objects and processes in the natural environment. Through skillful questioning, learners are guided to look and to see for themselves, to think about what they have observed, and to integrate and synthesize the significant elements of their observations, until they are able to formu-

Students explore and discover in the extended classroom.

late a reasonable conclusion as to "What happened here?" Thus knowledge is derived through the use of the resources and materials of reality rather than through mere verbal dissemination of factual content. Telling, alone, is not teaching. Teaching in out-of-classroom environments requires that the learners be involved in experiencing. In this way, students are motivated to use all of the senses (multisensory learning) in seeking answers to the countless mysteries which confront them every step of the way along the outdoor path to inquiry. Learners substitute their own firsthand experiences in the form of sights, sounds, odors, tastes, and tactile

"The strangeness of the familiar is too familiar to be observed."—Edwin Way Teale sensations for symbols in a text; thus, they enhance and make more meaningful the great mass of verbal knowledge to which they have already been exposed.

Writer-naturalist Edwin Way Teale has said, "The strangeness of the familiar is too familiar to be observed." It is to help children become aware of "the strangeness of the familiar" and to incorporate these discoveries into their own system of appreciations and understandings that an exploratory approach to learning can most effectively be employed by the teacher outdoors. The following section will help us to focus more precisely upon the teacher's role, when applied to specific learning situations.

INQUIRY IN AN OUTDOOR LABORATORY

As an instructional strategy for "finding out," inquiry embodies elements of other approaches to learning which have carried various labels, such as problem solving, discovery method, Socratic method, exploratory approach, leading-question technique, nondirective approach, and so on. Whatever the label, this approach to the teaching-learning process has one basic aim, namely, to *involve* learners *in* and *with experience* to the extent that they are able to formulate their own questions, seek their own answers—in other words, to enable them to find out for themselves.

The following sections: Telling Is Not Teaching, Exploratory Learning, Inquiry, and Problem Solving, will serve to clarify the difference between a straight-lecture approach and teaching strategies which incorporate inquiry or exploratory learning.

Telling Is Not Teaching

Time and again we are told that *telling is not teaching*, and yet we persist, with verbal inundation which drowns learners in a sea of words.

Picture this scene: The setting is a sixth-grade classroom. The teacher, Mr. Glib Gab, is holding forth in his usual style. "Class, today I'm going to tell you about a fossil that I found on my vacation last summer. This is called a cephalopod. Its origin was an ancient Ordovician sea some 360 to 420 million years ago. The word 'fossil' means to dig up. It is derived from the Latin word *fodere*, which translates 'to dig up.' Originally the word 'fossil' referred to most anything of mineral composition or of unusual form that was dug from the ground. Today, however, the word 'fossil' means any direct evidence of past life. Other examples besides this bit of marine life would include ancient clam shells, dinosaur bones, plant impressions, and footprints of extinct animals.

"Most of the time we find fossils in sedimentary rock, such as mudstone, shale, limestone, sandstone, dolomite, and conglomerate. They may also be found in some igneous and metamorphic rocks. A rock called 'coquina' is almost completely composed of fossils."

This scene, or one much like it, is an all too common occurrence in the modern classroom. Mr. Glib Gab's monologue, more than likely, could have continued in a similar vein for quite some time. There was little opportunity for the students to interact with one another as inquirers or with the object of study, the fossil itself.

Exploratory Learning

By way of contrast, let's shift the scene to an out-of-classroom learning situation. The scene is a gully. The gully twists and turns invitingly so that you can't quite see what is around the next bend. This very characteristic makes you want to venture around the next bend to see what lies ahead. The gully floor is strewn with a variety of rocks that have been carried along intermittently by the rushing torrent that charges headlong to the river with each rain. The gully is a hunting ground filled with countless treasures. Today it is also filled with eager students—eager because they have an opportunity to explore on their own. They have managed to get from between the two covers of the textbook, for a few hours at least.

To illustrate, we will focus on the dialogue between the teacher, Ms. Catalyst, and one of her students.

Student: Wow, Ms. C., look what I've found! What is it?

Ms. C.: Well, I'm not sure; let's take a closer look at it. (Ms. C. knows, she just isn't saying, at this point.) Here, look at it under this hand lens. What do you see?

Student: Well, I see a shell. It looks like a clam shell.

Ms. C.: Look again. Is it actually a shell?

Student: Mmh, no! There's no shell material. It's just an imprint on this rock. I wonder how it got there?

Ms. C.: What else do you see?

Student: I see a lot of small grains of sand.

Ms. C.: Here, let's scrape a little off with my knife to make sure. Feel this. What does it feel like?

Student: It feels like sand. Yes, it's sand all right. This must be sandstone. I still wonder, though, how the imprint of the shell got into the stone.

Ms. C.: Let's see if we can figure out the rest of it. Where do you usually find shells?

Student: We go to the ocean each summer, and I've found lots of shells along the beach. Some of them even look like this one.

Ms. C.: O.K., now see if you can use all the evidence we have thus far to solve the rest of the mystery. There once was a shell, and now it is gone, but we have a clue in this *fossil*. (Notice the natural manner in which the term is introduced.) You figure out the rest of it. What happened here?

Student (after considerable head scratching and brow wrinkling):
Well, here's what I think happened. Shells are found by the shore, and the waves wash them back and forth. Some shells are washed up on shore, and some wash back out to sea. I've watched sand wash over shells at the beach. I've noticed some shells sort of burrow down into the sand. After a while, more sand would settle to the bottom and cover the shells, and over thousands of years the sand, and anything in it, would gradually turn to stone.

Ms. C.: You're doing fine so far, but what happened to the shell itself?

Student (who by now is completely caught up in the process of trying to solve the mystery):
Well, some of the shell would wear away from sand rubbing against it. This would be like sandpaper wearing it down. I think, too, that the shell might be composed of something that could dissolve in water.

This particular scene might well continue over a longer period of time. The investigation could easily extend over several days, while each of the students involved in the outdoor exploration employed a variety of classroom resources, including books, to gather additional information related to a particular discovery or problem under study.

To teach in the manner of a Ms. Catalyst requires skill, experience, and patience. For example: How does a teacher set the stage for inquiry? What types of questions encourage inquiry? What types discourage inquiry? How can teachers lead students along the path to self-directed inquiry, where they eventually pose their own questions?

The intent of inquiry is to promote investigation on the part of the learner. The investigative process involves both students and teachers, for both are learners. Teachers, in fact, must be able to frame questions for which they do not necessarily have the answers. This is a complete break with tradition, for the traditional questioning process in teaching assumes that in order to ask a question, you must first know the answer.

Inquiry

Countless inventions and scientific discoveries would never have been made if the initial investigator or inquirer had based questions only on known answers. An experienced inquirer cultivates the art of posing questions that will lead learners to discover that which they do not know. To illustrate. Picture a group of third-grade inquirers—explorers—potential discoverers, who have wandered into a field of flowers. They come upon a flower that is strange to all, even to the teacher. The following dialogue takes place.

Child: I've never seen this plant before. I wonder what it is?

Teacher: Well, before we try to find out what it is, let's see just how much we can find out about it. Do you see any others like this one close by?

Children: Yes, here's one over here. I've found another. I'm standing by one.

Teacher: All right. Now how were you able to pick out these other plants just like this one?

Child: They're the same color and about the same size.

Teacher: Good. Now let's see what else we can learn. Just exactly how tall do these plants grow?

The children measure exact heights and then compute the average heights of this particular species. The teacher then continues the investigation by prompting the children to observe more closely, with questions such as How many petals does this plant have? How are the leaves positioned on the stem? Is the stem smooth or fuzzy? Draw a quick sketch of the leaf so that you have recorded the shape.

Teacher: Let's observe this plant in a slightly different way now. Until now we've tried to become familiar with its characteristics so that we can recognize others like it and can eventually track it down in one of our flower books. Let's take a close look at where the plant is growing.

Child: Most of them seem to like the sunny spots.

Teacher: Feel the soil. Would you say it is mainly clay or sand?

Children: It feels pretty sandy to me. Yes, and it's pretty rocky around here, too.

So the questioning would continue, and the accumulating evidence mount up to be sifted, analyzed, and refined into basic concepts and broad generalizations concerning the appearance, the characteristics, the growth, the habitat, and the requirements of this plant in particular and of all plants in general. This is inquiry in an outdoor laboratory situation. The learner is involved *in* and *with* the object of study in its ***natural setting.***

Problem Solving

Is it possible to motivate children to inquire? By all means. Children are naturally curious. Inquiry is most often triggered by some perplexity on the part of the learner. "I wonder why?" "I wonder how?" "I wonder what?" "I wonder when?"

How can a teacher motivate students to inquire? A problem or a series of "problem episodes" can be posed, which will puzzle, perplex, provoke, and heighten curiosity. Consider the following situation in which the teacher confronts the children with a problem. The strategy is to motivate the children to initiate inquiry by posing questions to the teacher that can be answered only with a "Yes" or "No." This particular approach forces the learner not only to observe closely and search out relevant data but, more importantly, to verbalize the inquiry. Picture this scene: Further along the gully just around one of those intriguing bends, the class has come across a muscular-looking tree, roots exposed, yet still clinging tenaciously to the gully wall. The teacher initiates the problem solving with a simple leading question: "What happened here?"

Child: Is the tree dead?

Teacher: No.

Child: Is this part of the main trunk? (It has the appearance of the trunk, because it is covered with a barklike substance.)

Teacher: No.

Child: Then are these roots?

Teacher: Yes.

Child: Was this part of the tree once under the soil?

Teacher: Yes.

Child: What happened to the soil?

Teacher: Remember, I can only answer "Yes" or "No." Rephrase your question, please.

Child: Was the soil washed away from the roots?

Teacher: Yes.

Child: But these don't look like roots—they're covered with bark.

Teacher: Ask some more questions.

Child: When the tree roots were first uncovered, would they have been smooth?

Teacher: Yes.

Child: I think I've got it. Did the tree grow bark to protect the exposed roots?

Teacher: Good question, class. That's probably what happened, and what pleases me most is that you figured it out on your own.

This particular teaching strategy reverses the usual procedure of teacher asking and students answering. The student inquirers frame the questions, and the teacher simply confirms information with a "Yes" or a "No" response. In order to pose relevant questions, children are forced to come to grips with various essential elements of the object or situation being studied. The learner must synthesize observable data in order to formulate pertinent questions. In this situation, children cultivate the art of questioning. Problem-solving strategies such as these prepare students to inquire on their own, independent of the school situation and the teacher. Thus we have the "complete learner" the self-learner.

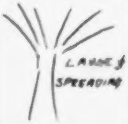
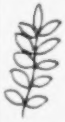
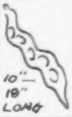
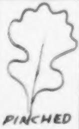
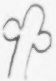
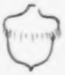
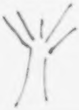
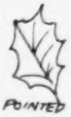
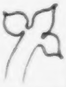
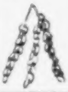
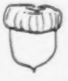
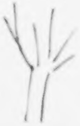
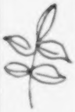
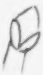
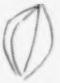
THE DIRECT EXPERIENCE APPROACH IN LEARNING TO RECOGNIZE TREES

Begin with reality—the thing itself. Rather than starting with book knowledge and then going into the field to identify trees from the description in the texts, let's try a more direct approach. Any tree which is unfamiliar will do for a start. Eventually we want to find out what this "unknown" tree is called. Trees, like families, have names. The ultimate aim is to learn much more than the name, however. Many would-be naturalists are able to rattle off name after name, perhaps even a Latin name or two, but still know little more about the tree. They may not know, for example, when the tree flowers, what birds nest in it, the appearance of the fruit, the texture of the bark, or the quality of the wood and its use.

The exploratory approach can be readily adapted to this learning task. In practice, it is a "natural." This outdoor teaching technique involves going to the thing itself—the unknown object—and attempting to discover as much as possible about it from first-hand observation. The time of year should make no appreciable difference. This approach works equally well at any season, since it is based on the learner's ability to examine closely the object about which information is desired. During the winter months, of course, the learner will have to rely on identifying characteristics other than leaves. Texture, color and patterns in the bark, the color and shape of buds, the overall configuration of the tree—all are vital observations in developing a *clue chart* as an aid to recognizing trees.

The teacher's role in this situation is to help students make discriminating observations. "Let's feel the bark before describing it." "Would you say that it is rough or smooth?" "How would you describe the color? Does it look brown, or gray, or greenish to you?" It doesn't matter how the bark is described in the tree book; if it looks gray to the observer, then it should be remembered as gray and be recorded as such on the clue chart.

TREE CLUE CHART

SHAPE	LEAVES	BUDS	BARK	FLOWER	FRUIT	ANY DISTINCTIVE CHARACTERISTICS	NAME
 LARGE & SPREADING			PEELING WITH — — — - MARKS	SMALL GREENISH HANG IN CLUSTERS	TWISTY BEAN  10"—18" LONG	LARGE THORNS GROWING IN CLUSTERS	HONEY LOCUST
LIMBS GNARLED & TWISTED	 PINCHED WAIST	IN A CLUSTER & ROUND 	DEEPLY RIDGED			ACORN CAP WITH FRINGE	BUR OAK
LIMBS REACH UPWARD 	 POINTED TIPS	IN A CLUSTER & POINTED 	VERTICAL LIGHT & DARK STRIPPING	LONG DROOPING CATTAILS 	ACORN 	SHALLOW ACORN CAP LONGISH NUT	RED OAK
		LARGE EGG SHAPED 	PEELING SCALY		 NUT	SHAGGY BARK	SHAG-BARK HICKORY

A technique which the authors have found to be quite effective is to have students pair off in teams of two, each team choosing a different tree. The teams should study their tree for 10 or 15 minutes and then record the characteristics they will want to remember. The purpose of this observation is to note characteristics that will enable them to distinguish this tree from others. Each team then reads its description to see if the information is specific enough to enable others in the group to recognize the tree. One can readily see that this little exercise in perception and expression calls for discriminating observation and accurate description.

The main idea in the "discovery approach" is that learners ask themselves, as they stand before the unknown specimen, "What do I want to remember about this tree in order to recognize others like it?" As the students gather notes in the field for their own personal clue chart for trees, they may come up with something on the order of the clue chart illustrated here.

Finding sufficient evidence to fill in each column of the clue chart may require many observations over several seasons. For example, the "Flower" column will be incomplete until the tree is discovered in its flowering stage. Once having completed a clue chart, however, the learner will have more firsthand knowledge of the trees being studied than the individual who has gained the information from books alone. One distinctive characteristic may be all that is needed to identify a particular species. Once having developed a clue chart, even in the winter the student should be able to recognize a tree without its leaves. For example, a tree which has opposite budding and branching and twigs which feel square rather than round is a blue ash. Even the beginning observer of nature soon learns to recognize the honey locust by its distinctive clusters of long thornlike projections covering the bark.

The teacher's role once again is not to point out and name 10 or 20 trees while hiking. It is highly unlikely that students would remember, for very long, two or three trees learned in this manner anyway. On the other hand, the teacher's role is to lead students to familiarize themselves with these unknown objects by close firsthand study. This approach to gaining knowledge with unknown subject matter puts the responsibility for learning squarely upon the learner's shoulders—where it should be. No matter how inspired, teachers cannot possibly learn for their students, but they can show them how to learn for themselves. In the outdoor classroom, students soon learn to rely on their own observations and their own judgments. They look to the teacher for guidance in thinking, not for the answer to everything.

THE CLUE CHART APPROACH FOR GETTING TO KNOW BIRDS

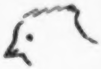
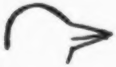
One of the easiest ways to find birds and to become acquainted with them is to bring the birds to the observer. This can be accomplished by establishing a feeding station in a spot that has suitable cover, such as thick shrubs, berry bushes, or a hedgerow, and supplying it regularly with a variety of feed. Most birds prefer a feeder that has good cover nearby so they may approach the feeding area cautiously, by easy stages. It may take a week or two before some birds begin to visit a new feeding area regularly. One shouldn't become discouraged if there are a few visitors at first; business will pick up as soon as the "bird-word" gets around. In addition to steady customers, who in all probability are permanent residents, the feeder will be visited by different species as the seasons change.

Suet will attract quite a few birds. Among those that show a decided preference for this food are chickadees; titmice; nuthatches; brown creepers; and hairy, downy, and red-bellied woodpeckers. The colorful cardinal favors sunflower seeds. Blue jays are the least finicky eaters; they will eat almost anything. Other foods that can be put out are squash and pumpkin seeds; popcorn; cut-up apples; and, of course, that old standby, bread crumbs.

How do youngsters learn about birds? Merely sighting a bird doesn't guarantee that it will be recognized. The clue chart, as we have seen, is a highly effective technique for teaching children to make discriminating observations; furthermore, it encourages them to record their observations.

A bird perches on a tree limb for a minute or two before flying off. In those few moments the children, under the teacher's guidance, ought to look for the following clues: Is the bird robin size, or is it larger or smaller? If the bird is larger or smaller than a robin, is it crow size or sparrow size? We use these three size standards because most children have a fairly accurate concept of these three common birds. Next: What are the predominant colors? Are there any distinctive markings or patterns visible? What about shape characteristics, in general? Is the tail slender and long or short and stubby? Is the beak long or short? Is the head rounded or crested? Size, shape, color, and markings will enable

The structure of a *Bird Clue Chart* might look something like this:

SIZE	SHAPE	COLOR OR MARKINGS	LOCATION OR SURROUNDINGS	SONG	FLIGHT PATTERN	NAME
SPARROW	TUFTED HEAD 	MOSTLY GRAY WITH RUSTY FLANKS	SEEN IN THE WOODS	WHISTLES "PETER-PETER-PETER"		TUFTED TITMOUSE
ROBIN	CHISEL BEAK 	HEAD: ALL RED BACK: BLACK & WHITE BREAST: WHITE	HARDWOOD FOREST	SEEMS TO BE SCOLDING & SAYING "QUEER, QUEER, QUEER, QUEER"	SWOOPS AS IT FLIES	RED-HEADED WOODPECKER
SMALLER THAN A SPARROW		BLACK CAP & RIB WHITE CHEEK GRAY BACK	SEEN IN THE WOODS, IN THE ORCHARD & IN THE FRONT YARD	SAYS HIS NAME "CHICKADEE DEE-DEE"	FLITS ABOUT A LOT	BLACK-CAPPED CHICKADEE

"Let's find out" is the byword of outdoor education.

the novice to identify many common birds. Picture a hiking group resting for a few moments by the side of the trail. A bird alights long enough for the hikers to gather the following clues: it is robin size, has a crest, and is entirely red. It doesn't take long for several children to locate this colorful specimen in one of the standard field guides and conclude that they saw a cardinal.

As children gain experience in observing closely, they will learn to make finer discriminations. The main idea is to look first at the bird as a whole and then to look for specific characteristics which will enable the observer to distinguish it from other birds. For example, in addition to noting whether the tail is long or short, one should ask whether the tail is long and pointed, long and rounded, or short and square. Besides noting whether the beak is long or short, one should ask if it is thick or slender or a specific color.

If a bird sings, does the song rise or fall? Does the song say anything, as does the tufted titmouse with its call of "peter, peter, peter"; or the "teacher, teacher, teacher" call of the ovenbird; the familiar "drink your tea" of the towhee; or the "chew-chew, sweet-sweet, chew-chew" of the colorful indigo bunting? Students should be encouraged to first listen carefully and then jot down what the song sounds like to them. Different individuals will note different characteristics in the same song. Children will learn to recognize a bird call best by what it sounds like to them—not by what it says in the book. After all, let's be realistic—the birds haven't read the book yet; they don't know what they're supposed to sound like.

Repeated observations in the field will contribute to one's knowledge of where to look for birds and where to find them. The surroundings in which a particular bird is most often found should be noted and recorded on the clue chart. Is it near the water, along a roadside, in the fields, or in the deep woods? Is the bird sighted most frequently on or near the ground, midway up in the foliage, or high in the top of a tree?

In flight, does the bird swoop, soar, flutter, dip, dive, fly straight-as-an-arrow or with an up-and-down wavelike motion? Birds can be recognized as readily by their flight characteristics as individuals can by the way they walk.

Some of the blocks on the clue chart are not filled in. It is unlikely that on any one day the teacher or the students will be fortunate enough to spot all of the characteristics of a particular species. In all likelihood, a number of field excursions will be needed before the observer gathers sufficient firsthand information to complete a personal clue chart.

The discerning teacher soon learns to exercise prudence and judgment in simply giving answers to students. Students should be encouraged to gather their own information whenever possible. Outdoor learners should be led to make their own observations, draw their own conclusions, and thus find their own answers to the countless "unknowns" in the natural environment. For instance, of what value is it for students when the teacher announces that a white-breasted nuthatch just flew by? If the students did not see the bird, they will still have no idea what it looks like. All they know is that the bird flew by and was sighted by the teacher. Birds that get away like this, before observers have a chance to become familiar with some of their identifying characteristics, are known among the birding fraternity as "just-flew birds."

Naturally, each student in the group will not be aware of every bird that happens by. A step in the right direction, however, is to show a picture of the bird that was sighted, right on the spot, and follow up with "What do you want to remember about this bird in order to recognize it? How large do you think it is? What are its main colors? How is it marked? Sandy, will you read the description aloud for the rest of us? Where are we most likely to find this bird? Perched on a wire? In a field? In the forest? Near the ground? Take a good look at the picture once more; then let's keep a sharp lookout. Perhaps we'll see this bird again."

The teacher or leader who employs this type of approach helps students to develop the kind of observational skills that will enable them to learn how to recognize unfamiliar specimens. These observational techniques, along with the clue chart approach, allow the learner to become familiar with hitherto unfamiliar areas of knowledge.

THE EXPLORATORY APPROACH APPLIED TO THE STUDY OF ROCKS AND MINERALS

The study of rocks and minerals is another subject matter area which lends itself particularly well to the exploratory- or discovery-approach to learning. The very young, even first and second graders, are capable of making some basic discoveries about rocks through direct experience. One approach is for the teacher to instruct the children, as they hike along, to search for and collect as many different looking rocks as they can. Before the children become too loaded down with rock specimens, they are directed to sit in a circle, where everyone will have a front-row seat. The next step is to see just how much can be discovered about the rocks that have been collected. First, the rocks are felt and separated into two piles, those that feel rough to the touch and those that feel smooth. The rocks are then separated into more piles, this time according to color. This initial exploration may take an hour or more without the name of one rock or mineral ever being mentioned. At this point, names are of secondary importance. Of far greater importance is that the children are discovering some of the fundamental properties of rocks. Rocks, for example, have different textures, varying from rough to smooth. Some are very hard, while others break apart quite easily. Some rocks, it will be noted, are composed of different-colored ingredients. The generalization would be that these rocks must consist of different substances (minerals). This is, of course, a very elementary approach; nonetheless, it is basic to sound learning.

Older students would be in a position to pursue the investigation in more depth. "We see layers in this rock; how do you suppose it was formed?" "This specimen appears to be composed of crystals; can you speculate as to how it may have been formed?" Discoveries of this sort can lead to insightful discussions pertaining to the types of rocks that are formed under water and those that are formed from molten material and harden deep within the earth's crust. After children have made a few of these basic discoveries for themselves, it is a good idea to let them examine several rocks that are examples of the various rock forms. Most young children are familiar with sand, having played in a sandbox or having been to the beach. They observe that tiny grains of sand have been cemented together to form a stone. In many cases, children can even name the rock correctly. The teacher might continue, "Frequently sandstone is melted and pressed together to form a new rock called quartzite. This is a sample of quartzite." A similar story of change can be demonstrated with mud or clay changing to shale and finally to slate.

For children to learn first that rocks are "sedimentary," "igneous," or "metamorphic" is neither necessary nor desirable. Nor should teachers feel that they must wait until their students can understand these terms before introducing the study of rocks. It is far more desirable for children to think of rocks initially as "water-formed," "fire-formed," or "changed." When more technical terms are introduced later, at a higher grade level, the terminology is likely to have a greater meaning, because it can be related to concrete experience.

SOLVING PROBLEMS ABOUT A RIVER

A stimulating learning opportunity may appear when one least expects it. To ignore the opportunity would be to miss what might develop into a most valuable teachable moment, but to stop and consider the possibilities may result in developing an exciting, thought-provoking, on-the-spot lesson in problem solving.

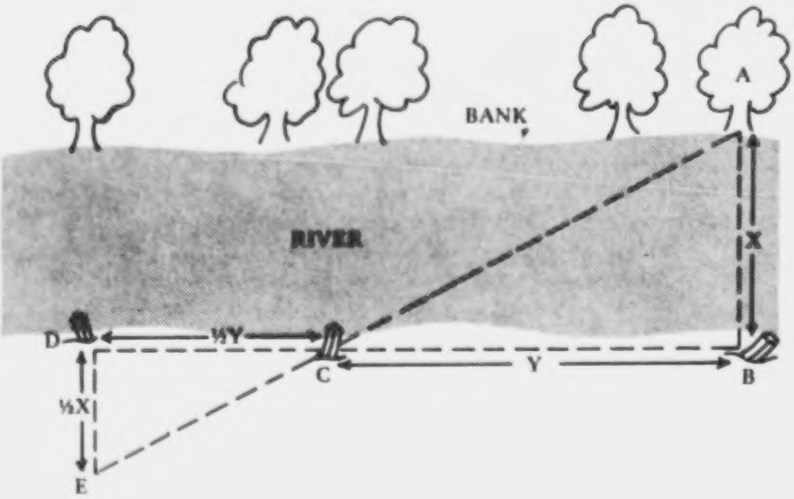
This type of situation might arise spontaneously when a group is hiking along a riverbank. As the students pause to gaze at the river or to dip their hands in the water, questions frequently are raised. "How deep is this river?" "I wonder how far it is to the other side?" "How fast is the water flowing?" To pass quickly on to something else would be easy, but to help the youngsters find some of the answers to their questions would be quite challenging. If the teacher were to throw these questions back to the children to solve, the student who wanted to know the depth of the river might reply, "We can measure the depth at the riverbank with a stick." Another member of the group would join in, "But that wouldn't be the depth at all places across the river." Another suggestion would not be long in coming, "We could get a boat and lower a weighted string at different spots." After acting on these suggestions, the children would soon have the data needed to determine the depth of the river at various distances from the riverbank.

The students might think that while they have the use of a boat, it would be a good idea to stretch a string across the river and then measure the string to figure the width of the river. The teacher could guide the students in this situation by telling them that there are several ways to solve this type of problem without leaving this side of the river. Depending somewhat on the grade level and the ability of the group, they could use the "Pace-Angle" method or the "Napoleon" method.

How to Measure the Width of a River by Using the Pace-Angle Method

Procedure: (See diagram on next page.)

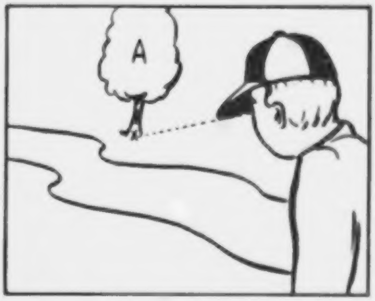
- Locate a tree on the opposite side of the river (A).
- Place a stick on this side exactly opposite the tree (B).
- Walk along the shore at right angles to AB. Take 20 paces (Note: one pace equals two steps). At this point place another stick (C).
- Continue walking along the shore in the same direction for another 10 paces. Place another stick at this point (D).
- Turn away from the river at D and walk at right angles to DB until you can sight through stick C to A. Stop and mark this point (E).
- Line DE is half the distance across the river. Pace this distance and double it to determine the width of the river at points AB.

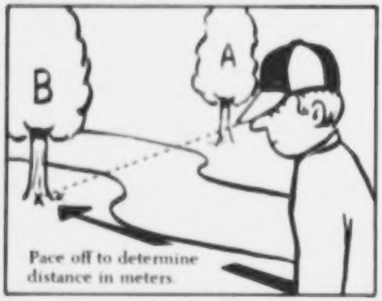


How to Measure the Width of a River
by Using the Napoleon Method

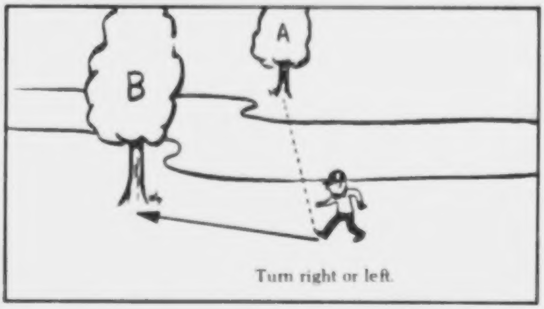
The Napoleon method is a rather simple procedure for approximating the width of a river. This method requires only a hat, or cap, with a brim. If one has no cap, the hand, palm down, can be held just above the eyes. This method consists of the following three steps:

- Sight under the hat brim or edge of palm to the opposite edge of the riverbank (Tree A). Raise or lower your head until a proper line of sight is drawn.
- Holding your head perfectly still, turn at right angles to the river (either direction, up- or down-river; the terrain may determine this). Line up the hat brim or edge of your palm with a landmark on this side of the river (Tree B).
- The distance from where you stand to the sighted landmark is approximately the width of the river. Pace it off, and determine the distance in meters.





Pace off to determine distance in meters.



Turn right or left.

How to Calculate Velocity of a River Current

Calculating the speed of a river current might prove a bit more complicated. However, if students comprehend that rate of flow is the same as so many distance units per time unit, the solution is close at hand. One approach is to measure off a known distance along the riverbank, 100 meters, for example. Then one of the students should throw a floating object into the river, while another records the length of time it takes the object to cover the measured distance. The result of this calculation would be in meters/minute. Since rate of meters/minute may be difficult for some students to conceptualize, it may be converted to kilometers/hour, a rate with which they may be more familiar.

Students may ponder the following questions while working on the mathematical calculations to this problem: How many minutes in an hour? How far would a floating object be carried in one hour at this rate? How many meters in a kilometer? To solve the problem, do we multiply or divide? For example, if the children had determined from their initial trial that the rate of flow was 10 meters/minute, the answer, when converted, would be 0.6 kilometer per hour. The calculation would be: 10 (meters per minute) × 60 (minutes per hour) ÷ 1,000 (meters per kilometer) = 0.6 (kilometers per hour).

USING A FIELD TRIP GUIDE SHEET

Another outdoor teaching device, to be singled out for special attention, is the field trip guide sheet type of instructional aid. Developing this type of aid requires considerable forethought on the part of the teacher or trip leader. A preliminary survey of the field trip site is absolutely essential in order to make rough notes on points of interest and subject matter to be covered.

A particular advantage of the field trip guide sheet is that it serves as a ready-made guide to the sequence of the trip. All members in the group share in a common experience, and their attention is directed to the same specific points. The guide sheet can be used to (1) pose questions, (2) point out specific items of interest, (3) clarify terminology, and (4) provoke thought and further discussion. The guide sheet is purely a supplementary instructional aid; it cannot possibly take the place of the teacher. Properly used, however, within its own natural limitations, it serves as a most effective teaching aid. For example, a guide sheet is particularly effective in promoting independent investigation on the part of students. Children will proceed along the trail at their own rate of speed, some stopping longer than others at a particular point to examine a "find" of special interest.

There are a few pitfalls to avoid when using this device. One danger is that some students fall into the trap of using the guide sheet simply as a check list, following it so closely that they overlook or even ignore other exciting discoveries along the way. By the same token, teachers or trip leaders may also adhere so closely to the check sheet that they may miss a golden opportunity for capitalizing on a "teachable moment."

The guide sheet, "A Hike to Ganymede Spring," is merely one example of the many forms this instructional aid may take, calling attention to the following:

- Some natural hazards.

- Specific trees and plants to identify.
- A few pertinent questions to ponder.

Using the guide sheet is only one aspect of the total experience. Upon reaching the spring, for example, the teacher would undoubtedly want to discuss several of the problems referred to on the guide sheet. The ability to identify trees and plants along the trail could be reinforced by playing several nature games, such as "What Leaf Is This?," "Leaf Relay," and "Leaf Matching." When the students return to the classroom, the guide sheet can serve as a record of the learning experiences on a particular trip and can be used to promote further reading, reporting, and discussion.

A Hike to Ganymede Spring

Things to See and Things to Talk About

- Watch your footing; a steep trail can be treacherous.
- Be on the lookout for a three-leaved vine that can make you itch. What is it?
- What kind of rocks are we treading upon? Pick them up. Feel them. Take a close look.

Trees and plants to see along the trail. Check off the ones you can identify.

- Black Locust
- Slippery Elm
- Smooth Sumac
- Hop Hornbeam
- Wild Grape Vine
- Virginia Creeper
- Hackberry
- Box Elder
- Linden or Basswood
- Shagbark Hickory
- Yellow Chestnut Oak
- Bur Oak

Take a look at the stone quarry halfway down the slope.

- What was this stone used for?
- Note some of the interesting burls on the hornbeams. What is a burl? Why does it form?
- In which direction is the river flowing?
- Is the river water clear or cloudy?
- Describe the plants growing by the river's edge.
- Put your hand in the spring. Estimate the water temperature. Estimate the air temperature. What factors could account for the difference in temperature?
- What is a spring?

The Self-Guiding Trail

The possibilities for developing a variety of self-guiding trails are virtually unlimited. Self-guiding trails can be devised to pique one's curiosity, to develop sensory awareness, to test powers of observation, and to pose problem-solving situations. Trails may be designed so that they may be used for teaching, reviewing, and testing. One advantage of the self-guiding trail is that, if circumstances warrant, students may proceed by themselves, at their own pace, and may develop sensitivity and awareness of phenomena that they might tend to overlook in a group situation.

Prerequisite to planning and laying out a self-guiding trail is careful study by the leader to determine the characteristics of a particular site. In this manner, the unique natural features (including seasonal occurrences or transient features) can be used to best advantage in planning trail layouts, teaching stations, and so on. Guide sheets for the trail may be in the form of a mimeographed check list or a small printed booklet. Or, informational signs may be posted along the trail. A brief sampling, illustrating some of the possibilities for devising self-guiding trails with appropriate teaching stations, follows:

SENSORY-AWARENESS TRAIL

Station A

- Close your eyes, and examine the bark of this tree by touch alone.

The joy of discovery is enhanced through hands-on experience.

- What descriptive words would you use to describe the texture?
- Now write another brief description, based on your visual impression of the tree.
- Compare the two descriptions in terms of terminology and vividness of vocabulary.

Station B

- Stop for a quiet moment by the brook. Listen! What do you hear?
- Dip your hand in the water. Does it feel warmer or cooler than the air? Can you estimate the temperature of the water?
- Now check your estimate with the thermometer attached to the chain. What was your margin of error in degrees?

Station C

- Examine the leaves on this tree.
- Sketch the leaf veins.
- Is the leaf simple or compound?
- Is the leaf margin smooth or serrated?
- Touch the underside of the leaf. Is it rough or smooth? What does it feel like to you?

Station D

- Crush one of these leaves. Smell it. How would you describe the odor?
- Smell a handful of humus beside the trail. What does it smell like?
- Taste one of the pods on this tree (honey locust). How would you describe the taste sensation?

OBSERVATION TRAIL

Station A

- Describe this flower. What does it look like to you?
- Sketch the overall structure, including the flower parts.
- How many petals? What color are they?
- How are the leaves arranged on the stem?
- Have any of these flowers gone to seed? Describe the seeds. Sketch them so that you have a permanent record in your notebook.

Station B

- Examine this snake skin.
- About how long would you say the snake measured?
- What colors and patterns do you see in the skin? Sketch the pattern, and describe it.
- How does the skin's outer surface differ from its inner surface?

PROBLEM-SOLVING TRAIL

Station A

- Can you figure out what animal has its burrow in this hollow log? What is the evidence?
- Why do you suppose the animal selected this particular location for a home?
- What would this animal feed on?

Station B

- Can moss on a tree be relied upon to determine the direction, north?
- Check 10 trees in the area to see if moss always grows on the north side of the tree.
- What sort of habitat does moss seem to prefer?

Station C

- If you were lost in the woods and had to live off the land in this area for several days, which plants would you select as a source of food?
- Which spot would you select as a campsite?
- How would you protect yourself from the wind? The cold? The rain?
- Would it make more sense to wait for rescue here, or to attempt to find your way back to civilization? What would you do?

SUMMARY

It is quite obvious from the foregoing that outdoor teaching strategies and techniques do not differ significantly from those that have been employed regularly by teachers over the years. Greater stress, perhaps, is given to drawing information from students by means of inquiry and challenging them with problem-solving situations, as opposed to merely informing them, with so much empty verbiage. A premium is placed on involving the learner with concrete experience. Students are encouraged to make their own observations and to draw their own conclusions.

These procedures, however, have long been used by "good" teachers in the classroom, as well. The important distinction lies, perhaps, in the unique instructional setting which the extended classroom affords. Outdoors, teachers and students are forced away from traditional classroom stereotypes and, of necessity, must approach new areas of knowledge as mutual learners. When teachers no longer learn along with their students, they cease to function effectively as educators.

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CHAPTER 3

Extending the School Curriculum to the Outdoors

THE SCHOOL CURRICULUM includes all of the learning opportunities provided for children by the school. Curriculum planners—groups of professional educators, assisted by students, parents, resource persons from the community, and consultants—work together to determine the basic curriculum for the school district. In arriving at the basic curriculum, consideration is given to such factors as the nature of the students to be served, the social values and attitudes of the community, the knowledge base for the development of a literate citizenry, federal and state mandates, and the nature of the learning process.

Decisions are made regarding content areas to be included, and plans are put into action by teachers. Teachers are responsible for providing experiences for children, which guide their behavior toward reaching the goals of education.

The teacher's task is to design meaningful learning experiences for the children or, at least, to provide the opportunities for meaningful learning to take place. Educators have long searched for meaning and significance in learning. Since learning is a response to stimulus factors that are personally satisfying to the individual, the challenge is to discover the environmental situation in which this type of learning will take place for students.

The teacher must consider characteristics of student populations in selecting the methods and strategies for teaching. Such factors as the learners' inherited capacities, talents, capabilities, motor-skill development, attitudes, values, skills, and interests are important aspects in deciding on the proper learning environment. Each of these determines how a learner will react in an environment. Selecting the proper situation for the learning experience is a choice that teachers have.

The classroom provides one kind of environment for learning but has definite limitations for providing hands-on, personal involvement–type experiences. *Learning by doing* transforms the learner from a passive observer to an active participant. Examples of objects or situations common to the real world will excite and interest students to a greater extent than their contrived counterparts. Students, from an early age, have been bombarded with stimuli from the real world; students need guidance and direction to help them determine meaning and significance from the actions of a functioning society. Students need help in focusing on a value structure consistent with that denoted in the curriculum. Attitudes which promote positive action to work toward the improvement of the community and society, in general, need to be developed. The real world should be a teaching aid—a real-life study of "life."

Whether the outdoor classroom is the school site, any one of a number of resources in the community or surrounding area, or a resident outdoor education center, the experiences in the outdoors should be planned to foster the goals expressed in the basic school curriculum, while providing students with environmental situations in which meaningful learning can take place.

Once the techniques for teaching in the outdoors are realized, the outdoor environment provides unlimited possibilities for activities aimed at specific content or processes. Activities can range from the open-ended exploring of an area to the directed study of a specific area or object. Children are innately curious and are avid explorers. Winding forest trails, a dried-up creek bed, a still woodland pond, a windblown field, or a dismal swamp beckon to the would-be explorer.

THE TEACHER AS OUTDOOR LEADER

Many of the techniques that teachers use daily in their class-

Teachers practice their skills in real-life situations.

rooms are adaptable and suitable to study in outdoor environments. Teachers *need not have* all the answers and should not feel inadequate if they do not. Teachers who can skillfully turn children's questions back to them, causing them to look again, to examine more closely, to collect data, and, generally, to extend their powers of observation, are capable of teaching in a variety of settings.

Study in the outdoors should not be thought of as a "guided tour through the wild." The teacher's role extends far beyond that of "tour guide," because it does not require having the "right" answers. If the teacher has content background, certainly, there are ways to incorporate it into the outdoor lessons. But, the teacher's major task is to "guide learning"—this implies that the teacher may be as much a learner as the children, and often is.

ACTIVITIES IN THE OUTDOORS

In the first part of this section, a few activities are discussed in detail in order to give a complete picture of the activity and its relationship to the curriculum. The second part of this section will list many ideas for outdoor activities, dividing them into seasonal topics or content topics. It is hoped that the teacher can begin to understand the way outdoor activities can fit comfortably into the curriculum format and the tremendous topical range of ideas for teaching in the outdoors.

Developing Sensory Awareness

SQUARE-METER FIELD TRIP

The school site or a vacant field is an excellent place to take students for a square-meter field investigation. The students are asked to find an interesting spot—usually with some variety in vegetation or with some unusual features. Using a meter stick or a metric tape, the teacher should mark off 1 square meter of ground. The students are given a specific time limit to investigate the area. They should record information such as types of plants (grass, weeds, flowers, fungi, etc.); types of animals (ants, bees, "bugs," etc.); type of base (clay, sand, gravel); sounds heard; texture of plants (rough, smooth, spiny); odors in the air; colors of objects; how many different plants; and how many different animals. After children have shared their findings, they might write a poem about their "spot," graph numerical data (if collected), or research to find names of plants and animals found in the square meter. They might draw a scale model of the area, using symbols to represent key inhabitants. A legend describing the symbols can be put at the bottom of the map.

What is the role of the teacher? First, the teacher needs to introduce the activity and explain why students are doing it. The activity may fit into a science unit; it may be connected to the idea of "exploring"; or it may just be an exercise in extending the powers of observation, data collecting, and sharing of information. The teacher needs to outline expected behavior and spark interest on the part of the students for exploring a microhabitat. "Predict what you might find." "Will the findings be the same for each square meter?" "Let's see how many different things we can find as a group."

The teacher should make sure that each child is prepared for the activity, that is, properly dressed for the weather, equipped with materials to conduct the activity, and aware of the importance of each one's personal contribution to the success of the activity. The teacher is the facilitator of learning; the students are the learners. A new and exciting learning adventure is underway!

ABC SCAVENGER HUNT

The scavenger hunt combines the skill of observation by focusing on the familiar, with the skills of language arts, spelling, and word usage. Children may work alone or in groups for this exercise. They should list the alphabet on a sheet of paper. For each letter, they should try to find an item in nature that corresponds and write the name of the object next to the letter. For example:

A. acorn; ant; apple
B. bug; bark; beetle
C. crow; cherry; candy wrapper[1]

SENSORY-AWARENESS HIKE

Sensory-awareness hikes may take many different forms and may be conducted in many different places. The idea is to focus on sensory perception: hearing, seeing, touching, and smelling (tasting is not recommended in this activity). The students should stand or sit perfectly still and close their eyes. Blocking out one sense often heightens another. This should help them discover how many different sounds they can hear. It is not necessary to identify the sound, a general description will do. "Bird call" would suffice, but later, students may want to try to determine what birds are in the area through further study. The key idea is that the children recognize a variety of sounds. Which sounds are pleasant? Which sounds are unpleasant? How is "sound" different from "noise?"

The sense of touch can be heightened by the students' going on a blindfold hike. Children can be divided into groups of two, with one person the leader and one the blindfolded hiker. Each time the hikers are led to an object or area, they should be given time to explore it. For example, the hikers can be led to a tree.

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[1] If items that do not belong in the environment are allowed to be used, a discussion might follow about how the aesthetic quality of the environment is affected by littering. Thus, a greater sensitivity toward the environment might ensue.

They should smell it; feel the texture of the bark; carefully examine other features, such as size, branching pattern, and leaf type; and describe the tree verbally, while exploring it. Words such as "ridged," "bumpy," "scratchy," "silky," or "rough" might be used to describe bark. Again, an opportunity to expand vocabulary, while allowing for individual interpretation, is presented. Each child should be given the opportunity to investigate. The same exploratory approach can be applied to leaves, rocks, buildings, plants, and animals.

Still another sense frequently overlooked, which can be used in developing an initial awareness to the outdoors, is the sense of smell. Have you ever tried smelling your way along a trail? Crush a leaf, lift a handful of moist soil from beneath leaf mold, or break open a fruit and sniff. The more senses one can involve while exploring the outdoors, the more vivid will be one's perceptions.

What has actually happened in each of these instances? The teacher has been a facilitator of learning; the students have become more aware and have extended their powers of observation. Teaching and learning have taken place in an outdoor setting. The children had firsthand experience with what they were learning, and they were actively involved in the process.

Nearly all areas of the curriculum may be complemented with appropriate learning experiences in the outdoor laboratory. The outdoor setting could be a school site, a nearby park, a forest preserve, or an area owned or used by the school district. The way in which the outdoor experience is related to the curriculum may be highly organized and structured, as with a specific lesson containing specific concepts or definite processes geared to the outdoor environment, or it may be unstructured and informal, as with an exploratory hike through the schoolyard. The type of structure is determined by the individual teacher, the time available, the site, and the purposes to be achieved. Connections can be made between the outdoor experience and science, language arts, mathematics, problem solving, art, reading, writing, music, physical education, and social studies, either through actual experience at the outdoor site or through follow-up activities back in the classroom that relate to the outdoor experiences.

TEACHABLE MOMENTS

Even in a highly structured program it often happens that a unique and exciting event takes place that was not part of the original plan for the day. For example, while on a trip to explore the geologic formations near a small lake, a group of children and their instructor spotted a mass of black, jellylike eggs near the water's edge. Upon close observation, the children observed that each small marble had a baby tadpole inside. Carefully, one of the children transferred a few of the eggs to a container filled with lake water in order to move the eggs to a place where all the children could observe them. The eggs began to hatch. The wiggly babies ruptured their bubblelike prisons and darted free into the water. After a few minutes, every egg had produced one tadpole, and every child had observed one of nature's most fascinating phenomena—birth. The children carefully returned the tadpoles to their natural habitat and watched their behavior "in the wild" before returning to the planned activity for the day. This drama at the water's edge represents a "teachable moment," and, although unplanned, it became the highlight of the day for the students.

The teachable moment may also occur when children, while engaged in a series of problem-solving activities, develop curiosities about the area they are studying. For example, some students were using the outdoors for solving problems in mathematics. They were quite familiar with word problems in their textbook, but in the outdoor setting they were solving problems where they could actually visualize space and distance. Exercises planned by the teacher included measuring the size of an acre, determining the number of board feet of lumber in a tree, and learning to use the Biltmore stick and the Merritt rule in figuring board feet. When the students returned to their meeting area via a river trail, they began asking questions. "I wonder how wide this river is?" "Which way is the river flowing?" "How fast is the river moving?" Within a few minutes the students were confronted with an entirely new series of arithmetic-related problems. The teacher assisted the children with developing techniques for solving the problems relating to their questions about the river.

Often experiences arising from student inquiry or from the unplanned "happening" become the most memorable. The deer that surprisingly shows up along the river's edge, the red fox that darts across the trail, or the family of turkey vultures circling above in search of food are just a few of the many "treasured moments" that are possible when teaching in the outdoors.

SEASONAL THEMES

The variety and number of valuable learning activities, which can be carried on in the extended classroom of the outdoors, are virtually limitless. These activities may be structured according to subject-matter areas, processes, or topics related to the curriculum. The outdoor learning activities may be organized according to the seasons. This approach makes the best use of nature's changes and focuses the children's attention to the process of changes in nature.

Things to See and Do When the Leaves Turn Color

STUDY THEMES FOR THIS TIME OF THE YEAR

- What causes the autumn season?
- Why do birds and some insects travel great distances at this time?
- How is the weather changing? Why is it changing?
- How are plants changing? Why are they changing?
- How are animals preparing for winter?

THINGS TO DO

- Watch for flocks of birds in migration. Identify them, if possible. Record data: date observed and approximate number of birds sighted.
- Keep a daily weather record, noting maximum and minimum temperatures.
- Record time of sunrise and sunset. Log the hours of daylight.
- Examine seeds under a hand lens, and classify them according to their mode of transportation.
- Observe changes of weeds (weeds are okay to collect). Make arrangements, using dried weeds and seeds for table decorations, or make arrangements on paper to hang as a wall decoration.
- Make spatter prints, using a variety of fallen leaves.

- Watch caterpillars make cocoons. Observe a cocoon in the fall, in winter, and in spring. Record the changes that occur.
- Research the reasons why leaves change color. Collect a variety of colored leaves that have already fallen from the trees.

Things to See and Do When the Snow Falls

STUDY THEMES FOR WINTER OBSERVATION AND RESEARCH

- Where and how do animals spend the winter?
- What constellations are visible in the night sky?
- What causes the winter season?
- How do plants survive the winter?

THINGS TO DO

- Investigate deserted bird nests to see how they are constructed.
- Follow animal tracks in the snow. Measure the tracks, and sketch them. Identify the tracks, if possible.
- Sharpen senses on nature trails by specializing in a different sense on each hike—listening, looking, touching, smelling.
- Look for animal homes.
- Set up bird-feeding stations. Observe, and record the birds that feed at them.
- Continue recording weather data.
- Record the azimuth for the position of sunset for a month, and note the direction of movement.
- Examine snowflakes and frost crystals under magnification.
- Measure depth of snow, and convert to inches of rainfall.
- Examine a snowdrift. Measure various parts, and examine snow at the top, at the middle, and at the bottom of the structure.

Things to See and Do When the Sap Flows

STUDY THEMES FOR THE SPRING

- How is the weather changing?
- What changes are taking place in plants?
- Examine the soil. Describe the types of particles that compose it. How do humans (i.e., farmers, landscapers) use the soil?
- How are plants and animals dependent on one another?
- How are plants and animals beneficial to humans? What responsibilities do we have to them?

THINGS TO DO

- Choose a tree, and study the changes it goes through in spring. Observe the life around it as spring emerges.
- Watch for the return of birds and the emergence of leaves and spring flowers. Record dates of significant happenings.
- Watch a pair of birds building a nest. Record their activities.
- Sketch or photograph a treebud as it unfolds.
- Record the changing position of the sun at sunset each day for several weeks.
- Observe animals. What is their principal activity?
- Visit a farm. Determine what types of activities take place. What conditions are necessary for plowing and planting?

Each season has particular characteristics and events that are unique to it. Gearing study to the season helps students to understand and appreciate natural phenomena.

THEMES FOCUSING ON THE NATURAL FEATURES OF AN AREA

Any realistic approach to making the best use of the outdoors as a laboratory for learning must give serious consideration to the geological and biological features of an area in which learning activities are to be carried out. Several examples of this approach to using the outdoors are suggested.

Things to See and Do with Hills and Valleys

If the geographic locale has a series of hills and valleys, a number of investigations tie into a study of why these geologic features are found. In order that the teacher may guide the learning experiences and stimulate the children to ask questions about the environmental features, it will be necessary to know some of the geologic history of the area before beginning the investigation with children.

In northern Illinois, the hills and valleys are the result of the last continental glacier, which retreated from the northern states about 20,000 years ago. This great continental glacier stood in Wisconsin, about 50 miles to the north. As the glacier melted, great quantities of stone and earth that had been carried from as far north as the interior of Canada were liberated. The melting of the ice mass also released vast quantities of water. Streaming down the river valley, the water carried with it gravel, sand, and clay. The murky waters continued to carry material to the Gulf of Mexico, but much material was deposited along the way. Boulders and rocks were carried down from the north so that, along with the native sandstone and limestone, igneous rock types are also found in the valleys.

THINGS TO DO WITH GLACIATION

- In an area of exposed bedrock, find grooves and scratches that were etched by rocks carried by glaciers.
- Estimate the width and the height of valleys.
- Search for glacial erratics—samples of rocks that are not common to the area.
- Make a map showing the types and extent of the glaciers that covered your area.

CAN YOU FIND OUT?

- What is a continental glacier?
- Where and how do glaciers originate?
- How does a glacier pick up and transport material?
- What causes glaciers to melt?

- What are the various types of moraines? How do they form?

While studying glaciated areas, students will find evidence of erosion. Of the three agents of erosion—wind, water, and glaciers—evidence of water erosion will be easiest for youngsters to spot. While making observations at a gully, students can incorporate a study of soil structure and composition.

THINGS TO DO AT A GULLY

- Follow a small gully from its mouth upward. Note the many small tributaries that feed into it.
- Find evidence of erosion along the gully.
- Examine the cross section of soil in a gully. Find different soil layers, and determine the types of particles in each layer.
- Collect soil samples, and study particles under magnification.
- Look for unusual features formed by moving water, such as potholes, small water falls, and deltas.
- Look for natural springs.
- Examine the area of deposition at the mouth of the gully. Identify the types of materials that have been carried down the gully and deposited.
- Identify soil conservation measures, and design a project to prevent soil erosion.

CAN YOU FIND OUT?

- What is topsoil? How long does it take topsoil to form?
- What is subsoil? Of what is it composed?
- What causes soil to wash away?
- How are humans dependent on topsoil? How much topsoil is lost yearly to erosion and to urban sprawl?
- What are some ways of controlling erosion?

Things to See and Do with Wildlife

In any ecosystem there will be a variety of animals that can be observed directly or indirectly through signs and homes. Caution must be taken not to disturb the natural habitat of the animal. Respect for the living inhabitants should be a key factor in visiting any area.

THINGS TO DO

- Look for various types of animal tracks. Draw them, and try to identify the animals that made them. Make plaster casts of the tracks.
- Look for animal homes, such as rock dens, hollow trees, and ground burrows.
- Search for other evidence of animal life, such as feathers, droppings, fur, bones, and animal sounds.
- What do the animals in the area eat? Find bark stripped from trees, empty nut husks, ground diggings.

CAN YOU FIND OUT?

- What are the most common mammals of your area?
- Where do these animals live? What do they eat? How does their life change throughout the year?
- How are the animals of your area protected? Are there laws relating to them?
- In what ways are the animals of your area beneficial to humans? In what ways are they dependent on humans?
- Are any of the animals in your area on the endangered species list?

Things to See and Do with Astronomy

There is great fascination with stars and planets. Children can learn a great deal by observing the night sky on a clear evening at various times during the year.

THINGS TO DO

- Draw pictures and star maps of constellations so that you will be able to recognize them in the sky.
- Read stories about the constellations.
- Photograph star trails by taking a two-hour time exposure of the Northern Hemisphere.
- Plot the phases of the moon, and keep records for a month.

CAN YOU FIND OUT?

- How does astronomy differ from astrology?
- What constellations will appear in the sky during the time you are at a resident outdoor education center?
- Will the moon be visible during your stay? If so, what phase will it be in?
- Will any planets be visible at this time of year?

Things to See and Do with Rocks and Fossils

Unusual rocks, exhibiting a variety of colors, strange markings, and shapes, have always been of interest to children. Hunting for fossils provides an opportunity for children to uncover the mysteries of the earth's historical past.

THINGS TO DO

- Look for rocks that have unusual features.
- Use magnification to view crystalline structures in the rocks.
- Try to determine names for some of the common rocks.
- Categorize rocks into igneous, sedimentary, or metamorphic, according to observable characteristics.
- Examine a sedimentary rock outcrop for fossils.

CAN YOU FIND OUT?

- How are rocks and minerals related?
- How do rocks change from one form to another?

- How do fossils form? In what type of rock will they be found?

Things to See and Do with Bird Life

Birds are fascinating animals. They have phenomenal instincts that guide their behavior. They are beautiful to watch and interesting to observe, as they carry out their daily activities. A flock of migratory birds can spark a multitude of questions relating to the "whys" of animal behavior.

THINGS TO DO

- Hike around the school grounds to observe the variety of birds in the area.
- Set up a bird feeder near the classroom, and record characteristics of the birds that feed there.
- Find pictures of the birds common to the area, and research information about them; for example, what they eat, where they live, what their migration patterns are, what their family life pattern is, and what types of nests they build.
- Examine a deserted bird nest to determine how it was constructed and what types of materials were used in its construction.

CAN YOU FIND OUT?

- Why do certain birds migrate during the spring and fall?
- How has the development of communities affected bird populations and their natural habitats?
- Which birds, common to your area, are on the endangered species list? Why?
- What conservation measures can be taken to help maintain bird populations?

Things to See and Do for Environmental Quality

Understanding the factors which contribute to the degradation of the environment results in citizens that are more alert, sensitive, and responsive to the need for environmental quality. Children need to focus on their behavior and understand how this affects the delicate balance of the functioning ecosystem of which they are a part.

THINGS TO DO

- Take field trips. Observe firsthand a sewage treatment plant, a water purification plant, and a recycling center. Visit a local conservation project, such as a wildlife refuge, a nature center, or a prairie restoration project.
- Research areas of the community that are environmentally unsound. Take pictures. Try to determine the reasons for the problem, and suggest solutions.
- Write articles for the local paper, suggesting ideas for improving environmental quality.
- Study the layout of the community through aerial photographs, aerial observation, and maps. Determine traffic patterns, housing developments, open spaces, and provisions for recreation and shopping centers.
- Collect aluminum, paper, and/or glass for a recycling center. Use the money collected to support a conservation project or an outdoor education program.
- Make a class scrap book of pictures and articles, collected by students, which deal with environmental problems. Articles and pictures from local papers are most relevant.

CAN YOU FIND OUT?

- To what extent are the lakes, rivers, ponds, and streams, associated with your community, polluted?
- What are the major environmental problems in large cities? In small towns?
- How are hunting and fishing laws related to maintaining environmental quality?
- What is the percentage of land in your community devoted to the needs of the automobile—freeways, streets, parking areas?
- Compare the amount of noise and the quality of air in a residential area, a business area, and an industrial area.

- Calculate the amount of garbage produced in your community in one week. How is this treated?
- What causes smog? How many smoggy days does your community have per year?
- How does air pollution affect human beings?
- What are the air quality-control standards of your area? What does it cost the community to meet these standards?

Things to See and Do with Water

Water is the substance upon which all living things are dependent. Rivers are used for transportation and recreation, as well as for sewage disposal. Water quality is affected by the very things that support the human population: industry, farming, power plants, waste disposal. The amount of rainfall in an area determines the types of agriculture and life styles found there.

THINGS TO DO

- Visit a watershed area for the water supply of the community.
- Study a stream. Determine the rate of flow, temperature and pH of the water, types of plants in and around the stream, and types of animals found in various parts of the stream.
- Develop an illustration to show how the water cycle functions in your community.

CAN YOU FIND OUT?

- How is water polluted?
- How do you know if water is safe to drink?
- Where does your community dispose of liquid waste?
- Do industries in your community use the river for disposal? For transportation? How is it used for recreation (if applicable)?
- How much rainfall is common to your area? How does the rainfall affect the type of business/industry and people's lifestyles?

Soil is also a vital part of our existence. Food production is one of the major concerns in our country, both for our own use and for export. Soil is affected by the forces of erosion and humankind's treatment of the land.

THINGS TO DO

- Visit a road cut to observe a soil profile, and sketch the layers.
- Visit a stream or gully, and note how the water erodes the banks. Determine the rate of "cutting" in a gully.
- Develop projects that will prevent soil erosion by wind and water.

CAN YOU FIND OUT?

- What types of materials compose each layer of the soil profile?
- Of what is topsoil composed? Of what value is topsoil?
- How much topsoil is lost annually through erosion in the U.S.?
- What is the water-holding ability of gravel? Of sand? Of clay?

OUTDOOR LEARNING ACTIVITIES RELATED TO THE SCHOOL CURRICULUM

The number of experiences that can be carried out in the outdoors that relate directly to the curriculum areas generally described by a school district is limited only by the imagination of the teacher. The following examples are activities that have proved to be successful learning experiences for children. Here, the major areas of the basic school curriculum are dealt with individually so that specific examples can be noted. In actuality, skills, concepts, and processes are often integrated when a particular task is undertaken.

Mathematics

GENERAL OBJECTIVES

A. To use standard measuring instruments, such as a compass, metric tape or meter stick, thermometer, barometer, and scales.

B. To estimate distances, time, quantity, and space.

C. To apply mathematical skills to firsthand experiences in the outdoors.

ACTIVITIES

- Cut and pile a cord of wood.
- Measure: a board foot
  circumference and diameter of trees
  surface area for map making
  dimensions of camp buildings
  percent of slope
  distance between buildings, trees, etc.
  distance in hiking by using the pace method

Orienteering involves mapping and problem-solving skills.

- Estimate: height of a tree or hill
  age of a tree through ring count
  time of day
  distance hiked
  distance away of lightning
  width of a river
- Average: temperature readings
  barometer readings
- Plan amounts and costs of food for cookouts.
- Figure finances for the outdoor experience.
- Construct shelters, check dams, bridges, and feeding stations.
- Operate a bank and store at the resident center.
- Compute the amount of open space in the community.

Language Arts

General Objectives

A. To write legibly and spell correctly.
B. To express oneself in both written and spoken word.
C. To read and interpret correctly.

Activities

- Write letters home.
- Keep field notes.
- Plan a daily program.
- Keep a journal.
- Identify and label specimens.
- Write poems, songs, and stories.
- Research a plant or an animal, and give a report on your findings.
- Write a column for a newspaper.
- Make up a story about a fictitious character, and tell it at a campfire session.

Keeping field notes is a part of outdoor study.

Social Studies

General Objectives

A. To demonstrate an interest in, and an understanding of, local history.

B. To show an understanding of democratic procedures and group processes.

C. To explain relationships between humankind and the natural environment.

D. To demonstrate an understanding of some of the socio-emotional needs of humans.

E. To describe how local government functions.

Activities

- Look for Indian relics.
- Construct pioneer buildings and household articles.

- Investigate a small community nearby.
- Visit a local site of historical significance.
- Use natural materials in making craft items.
- Make maps and models of an area.
- Put on a pageant, presenting a local historical event.
- Participate in an Indian ceremonial.
- Visit a working farm, and find out how the operation is affected by, and how it contributes to, the economy.
- Research the structure of local government. For what is each post responsible?
- Photograph areas with aesthetic value, and photograph areas that show misuse of the environment.
- Develop a map of the community showing land-use, including open space and areas for leisure-time pursuits.

Natural Sciences

General Objectives

A. To recognize some of the common plants and animals in the local area.

B. To explain how plants and animals are dependent on one another.

C. To describe various methods of seed dispersal.

D. To describe uses for plants—both in modern times and as they were used by Indians and pioneers.

E. To recognize the need for wise conservation practices in terms of plants and animals.

Activities

- Use the clue chart approach for identifying local plants and animals—particularly flowers, birds, and trees.
- Collect and press a variety of common leaves (after they have fallen).
- Make plaster casts or clay molds of animal tracks.
- Sketch the landscape. Sketch trees and plants in detail.
- Use a hand lens or microscope for studying plant parts, pond water, spores, small animals, etc.

- Develop a nature scavenger hunt, and try it!
- Build shelters for animals, and build feeding stations for birds.
- Observe the habits of animals, and keep field notes.
- Find a bird nest (uninhabited), and study its construction.
- On a nature hike, find animal homes.
- Construct an aquarium or a terrarium.
- Learn to recognize local bird sounds and animal sounds.
- Use plant, tree, and animal products to make cooking utensils, cordage, whistles, fishing plugs, tea, and jewelry.
- Tap maple trees.
- Listen to night sounds.
- Diagram food chains for various animals.
- Study an area in each of the four seasons, and make a record of the changes.
- Plant a prairie plot.
- Replant seedlings in a burned-out area.

Earth Science

General Objectives

A. To list some general characteristics of rocks found in the local area and be able to describe rocks in terms of mineral components.

B. To describe the history of rocks and their contribution to soil formation.

C. To describe the causes and effects of wind and water erosion, and suggest ways of controlling them.

D. To recognize some major constellations.

E. To trace the pattern of movement of some heavenly bodies, such as planets, stars, comets, and the moon.

F. To explain how instruments are used to discover information about weather.

G. To demonstrate the handling and use of a thermometer, a barometer, a wind vane, and a rain gauge.

H. To describe weather conditions and predict weather to come.

ACTIVITIES

- Collect rocks that are common to the local area, and examine them. Observe their characteristics and components, and use a guide book to identify them.
- Take samples of soil from several different areas, and analyze them for composition (percent of gravel, sand, and clay).
- Test soil for acidity and for nutrients, such as nitrogen, phosphorus, and potash.
- Visit a quarry, and search for fossils.
- Hike up gullies, and observe rock outcrops, soil types, strata, and effects of erosion.
- Observe a specific site before and after rain. Take a hike in the rain.
- Study the slope of the land at different elevations.
- Visit a farm to observe conservation measures in practice.
- Observe major constellations in the night sky. Make star charts.
- Observe the moon through a telescope or binoculars.
- Make a chart showing the phases of the moon.
- Look for meteors.
- Photograph star trails.
- Make a chart showing the sun and the position of the planets around it; then look for planets in the night sky.
- Observe and sketch clouds.
- Build a weather station. Make some weather instruments.
- Use weather instruments to record temperature, air pressure, amount of rainfall, and wind direction and speed.
- Make a map showing present weather conditions. Make a map showing predicted weather conditions.

Health, Physical Education, and Recreation

GENERAL OBJECTIVES

A. To practice good health habits.

B. To describe the relationship between good health and enjoyment of life.

C. To plan a program of the wise use of leisure time.

D. To plan a menu for a week, including foods from four basic food groups.

E. To plan a program for daily physical exercise.

F. To describe safe practices in the outdoors.

G. To integrate health and physical education with other subject areas.

ACTIVITIES

- Make a chart showing the four basic food groups.
- Research vitamin deficiencies and related diseases.
- Make a chart of the structure of a tooth. Interview a dentist for information about maintaining healthy teeth and gums.
- Conduct panel discussions of proper dress for various activities in the outdoors during the four seasons.

The outdoor classroom is a place for fun and adventure.

- Practice outdoor safety in the following situations:
  - Going up and down hills.
  - Carrying saws, geology hammers, and other tools.
  - Taking care of fires on cookouts.
- Engage in various types of dancing, such as square dancing, folk dancing, rounds, and pioneer dances.
- Carry out service projects such as:
  - Cutting firewood.
  - Building a retaining wall or a check dam.
  - Setting tables, making beds, and cleaning rooms/dorms.
  - Clearing underbrush.
  - Adding to the aesthetic beauty of an area by mowing lawns, planting flowers, and planting trees.
- Make and use snow shoes.
- Enjoy winter sports, such as skating, sledding, and cross-country skiing.

Arts, Crafts, and Music

GENERAL OBJECTIVES

A. To demonstrate the use of natural materials in creating an art or craft project.

B. To demonstrate the safe use of a variety of common tools.

C. To describe the importance of art and music in everyday living.

D. To describe the relationship of art and music to various cultures.

E. To lead a song for a group of peers.

F. To demonstrate, through actions, the understanding of rhythm.

ACTIVITIES

- Sketch a variety of landscape features. Draw your favorite feature of the camp.
- Observe color tones in the distance.
- Collect natural materials—nothing living, please—and make a collage or a mobile.

- Make a simple loom from sticks and string; then weave yarn or grass mats.
- Make game equipment. Make a birdhouse or feeder.
- Make simple camp furniture; for example, stools and storage boxes.
- Using wood, whittle, carve, or chip something creative.
- Collect dried weeds, seeds, pine cones, feathers, and other dead/fallen objects, and make a table arrangement.

The outdoors provides inspiration for artistic expression.

- Make drums, rattles, tom-toms, or headdresses for Indian ceremonials.
- Take photographs.
- Learn some new songs.
- March, dance, skip, and clap to musical recordings/tapes, drum beatings, songs, etc.
- Compose a song, and teach it to others.
- Play singing games. Sing in rounds.
- Listen to recordings of music from various cultures and ethnic groups.

SUMMARY

Creative teachers open an entirely new world of realistic teaching-learning experiences when they step beyond the classroom into the outdoors. The myriad of educational opportunities guarantees relevant topics and exciting activities for students at all grade levels. A variety of organizational patterns may be used, based upon topics, seasons, content areas, processes, or problem areas, but the significant factor is that the teacher uses the real world—the outdoor environment—to achieve the goals and objectives of the school curriculum!

SUGGESTED READINGS

"Activities: A Collection of Things to Do at the Environmental Learning Center, Isabella, Minnesota." Isabella: Environmental Learning Center, 1975. (ERIC Document Reproduction Service No. ED 113 154)

Gilfillan, W. C., and R. A. Burgess. *The Teacher's Handbook for the Outdoor School*. Portland, Oregon: Multnomah Outdoor School, 1978. (ERIC Document Reproduction Service No. ED 175 590)

Link, M. *Outdoor Education: A Manual for Teaching in Nature's Classroom*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1981.

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Robinson, B., and E. Wolfson. *Environmental Education: A Manual for Elementary Educators*. New York: Teachers College Press, Columbia University, 1982.

Schramm, W. *Classroom Out-of-Doors*. Kalamazoo, Michigan: Sequoia Press, 1969.

CHAPTER 4

Learning Experiences for Outdoor Laboratories

TODAY'S TEACHERS must be capable of designing educational experiences that take place in many different types of learning environments. The outdoors is one such setting that can be used effectively by educators in the educational process. The variety of outdoor areas that can be utilized as learning laboratories are illustrated on page 82. Several lists of educational experiences are found in Chapter 2 and elaborated upon in Chapter 3. This chapter contains additional examples of learning activities appropriate for use by teachers in "outdoor classrooms." During the past several years, various "packaged programs" have appeared that have proven to be effective and popular with classroom teachers. A brief description and a few examples from these environmental education programs are also included in this chapter.

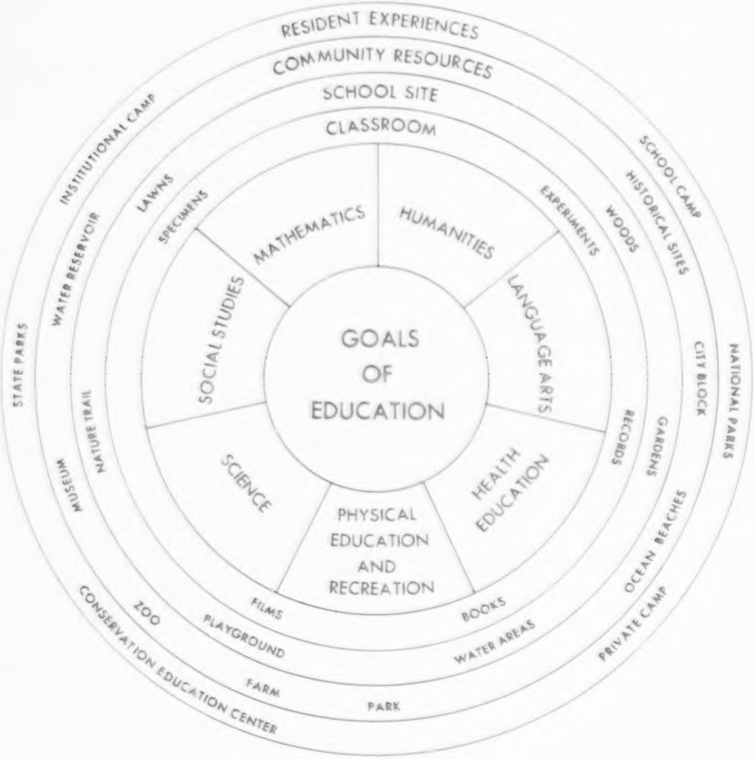
It must be emphasized, again, that one utilizes the outdoors as a learning laboratory—not just for the sake of going outdoors—but, because the outdoor laboratory is one of the most effective teaching-learning situations available for achieving various goals and objectives related to the total curriculum.

"JUST BEYOND THE CHALKBOARD"— THE SCHOOLYARD

Developing Awareness

The 100-centimeter hike allows children to discover and

OUTDOOR EDUCATION


RESIDENT EXPERIENCES
COMMUNITY RESOURCES
SCHOOL SITE
CLASSROOM
GOALS OF EDUCATION
MATHEMATICS
HUMANITIES
LANGUAGE ARTS
HEALTH EDUCATION
PHYSICAL EDUCATION AND RECREATION
SCIENCE
SOCIAL STUDIES
SPECIMENS
EXPERIMENTS
RECORDS
BOOKS
FILMS
LAWNS
WOODS
GARDENS
WATER AREAS
PLAYGROUND
NATURE TRAIL
INSTITUTIONAL CAMP
WATER RESERVOIR
HISTORICAL SITES
CITY BLOCK
OCEAN BEACHES
PARK
FARM
ZOO
MUSEUM
SCHOOL CAMP
NATIONAL PARKS
PRIVATE CAMP
CONSERVATION EDUCATION CENTER
STATE PARKS

Courtesy, New York State Education Department observe many different "things" found along a 100-centimeter length of string. Working in pairs, or working alone, the children should measure off and cut pieces of string 100 centimeters in length. Out on the schoolyard, the lengths of string are stretched out in various locations. The children take a "hike" along the length of their piece of string, observing and recording the different things that they find. All "explorers" should have the opportunity to share their "discoveries" with other members of the class.

Science

Most school grounds are landscaped to some degree. In many cases, plants, trees, and shrubs—both foreign and native—have been added for aesthetic and beautification purposes. These areas may be used by the teacher for:

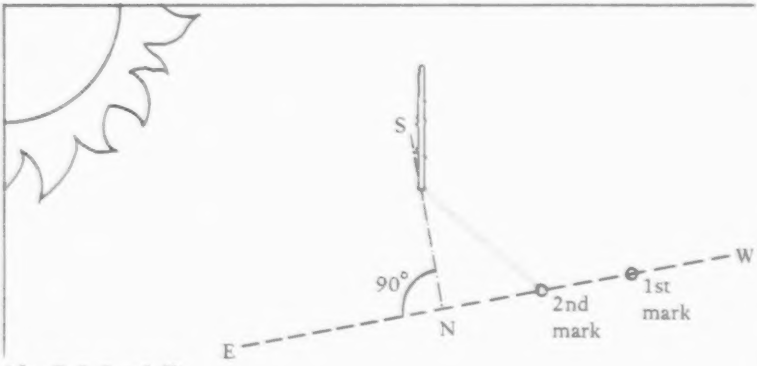
- Observing seasonal changes ◆ fall to winter to spring.
- Studying flower parts and functions ◆ identification and classification.
- Studying soil ◆ texture, temperature, pH, structure.
- Discussing environmental quality ◆ how living things enhance the quality of the schoolyard.

Mathematics

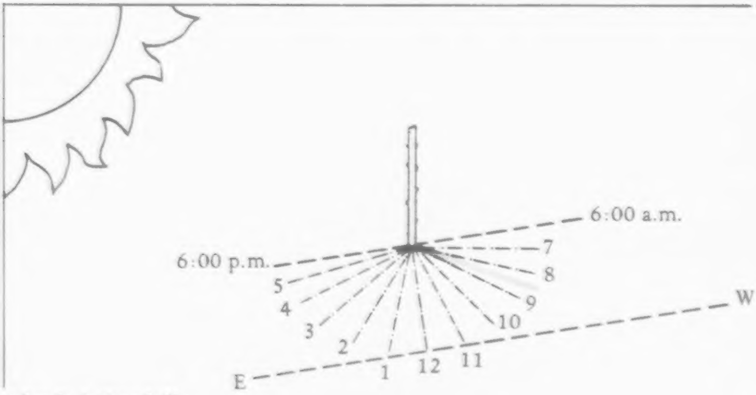
If there is a flagpole, or some other post that casts a shadow (this can be simulated with a meter stick), the "shadow-tip" exercise provides an excellent problem-solving situation. This experience develops a method of determining direction and time. In developing these understandings, the learner must determine relationships between the earth and the sun, rotation, and revolution. An inquiry approach should be utilized in following this procedure:

- To find direction, mark the tip of the shadow cast from a pole, or stick, at least 1 meter high. Wait approximately 10 minutes or more; then, mark the shadow tip again. A straight line through the two marks is an east-west line. Why? Draw a line from the base of the stick to the east-west line so that it will intersect at a 90° angle. This becomes the noon, or north-south line.

- To find the time of day, draw a line parallel to the east-west line that passes through the base of the stick (see illustration). This becomes the 6:00 A.M.-P.M. line. Divide the sections between the 6 o'clock lines and the noon line into sixths to complete the sun clock. The shadow is now the hour hand.


S
90°
N
E
W
2nd mark
1st mark

After R. S. Owndoff.


6:00 a.m.
6:00 p.m.
7
8
9
10
5
4
3
2
1
12
11
E
W

After R. S. Owndoff.

DEVELOPING A REALISTIC CONCEPT OF AN ACRE

Developing a realistic concept of an acre is another example of using the school grounds for learnings in mathematics. Some teachers might consider this concept outdated, because fewer people are now living and working on farms. Urban dwellers must understand this unit of surface measurement, too. How large is the lot on which their house, apartment, or condominium is located? What size is the parcel of land that is to be added to a nearby park or nature preserve? Is the cost per acre that the bond issue is requesting of the voters reasonable?

A correct verbal answer is very often interpreted as meaning complete understanding of a concept. Children growing up in an urban area can and do memorize tables of measurement in their arithmetic classes without realistic understanding. One typical measure that can be taught effectively and efficiently in the outdoor classroom is an acre. The question arises, "What is an acre?" The answer, from a book, comes readily: "160 square rods—4,840 square yards—or 43,560 square feet." "Correct, next question please."

Suppose the students were taken out on the playground, divided into several teams, and asked to place themselves in such a manner that the surface area between them represented an acre. The essence of the problem would still remain—just what does an acre look like?

This situation lends itself nicely to the problem-solving approach. Some members of the class might not know what a "rod" is. In pursuing the answer, the children might learn that:

1 rd. = 5½ yds. = 16½ ft.
1 sq. rd. = 30¼ sq. yds. = 272¼ sq. ft.

Since an acre is an area, or surface, measurement reported in square units:

1 acre = 160 sq. rds. = 4,840 sq. yds. = 43,560 sq. ft.

Feeling more comfortable with "feet," a unit of linear measurement with which they are more familiar, the children proceed to solve their problem. In arriving at the correct solution, they most likely will follow a procedure similar to this:

◆ If there are 43,560 square feet in an acre, and we know that the area (A) of a rectangle equals the product of the length (l) times the width (w), how wide will our plot be if we decide to make it 300 feet in length?

$$A = lw$$

$$43{,}560 \text{ sq. ft.} = 300 \text{ ft.} \times w$$

$$\frac{43{,}560 \text{ sq. ft.}}{300 \text{ ft.}} = w$$

$$145.2 \text{ ft.} = \text{width}$$

The youngsters will undoubtedly want to lay out these measurements with a tape to see how close "their" acres are to the "real" acre. As they try out different lengths to the acre, they will soon begin to realize that the plot could not only be a rectangle but could also be a square, or it could even be an area 1 foot wide and 43,560 feet long.

The lesson may be extended by relating the understanding of an acre with food production. For example, knowing the average number of bushels produced per acre and the average price per bushel of various crops, what will be the income for a farmer or rancher who manages so many acres of land for the production of various fruits and/or vegetables? (The local Farm Bureau or a nearby agricultural agent will be able to quote the statistics for a local area.)

SOCIAL STUDIES

On a field trip in the schoolyard, the children would list or name those "things" on the site that have been made from natural materials. Where are these natural materials found? Where is the item made? For example:

◆ Bricks in the building ◆ clay
◆ Window frames ◆ wood
◆ Flagpole ◆ iron
◆ Glass in the windows ◆ sand, limestone, sodium carbonate

General

Depending upon the natural "richness" of the school site environment, additional subjects may be studied. One task that every school should undertake is an assessment or inventory of existing study areas, possible learning activities, and the development of potential "outdoor laboratories." The following charts represent a possible format for such an inventory:

- Develop a map or sketch of the school grounds that shows the location of existing buildings, fences, equipment, play areas, vegetation, parking lot, etc.
- On an overlay sheet (e.g., acetate) or on a separate chart with matching symbols, identify the various areas on the school site that can be used by teachers and students for appropriate learning experiences. For example:

Area	Learning Activities
Fence line	Evidence of animal homes (Science)
Tetherball area	Shadow-tip exercise (Mathematics)
Parking lot	Computation of an acre (Mathematics)
Front lawn	Microclimate observations (Science)
Play area:	Temperature comparisons (Science)
Bare earth	Evidence of erosion: air, water, humans (Science)
Grass	"Sticklers" - OBIS (Science)
Blacktop	Shadow pictures (Art)

- On still a different overlay or chart, indicate those developments that would improve the educational potential of the school grounds. For example:

New Study Areas	Learning Activities
One-acre arboretum to include:	
Ecological habitats:	Various life cycles plus:
Pond or stream	Water
Woodland	Plant study
Meadow—Grassland	Insect study
Desert	Bird study
Special study spots	Art, language arts, weather
Soil pit	Soil study

Quite often, there are various resource agencies and individuals in the community that would be quite willing to assist in the original planning and contribute toward, or donate plants and materials for, the new developments. Students should be involved as much as possible in all aspects of such developments. It is through projects similar to this that children formulate basic concepts and understandings related to managing a quality environment.

Many of the planned programs of activities such as Outdoor Biology Instructional Strategies (OBIS) and Project Learning Tree (PLT) contain experiences that can be provided on a schoolyard.

"DOWN THE STREET OR ACROSS TOWN"— THE CITY PARK OR A VACANT LOT

Most communities contain one or more parks that can be used as an "outdoor classroom." If not, there usually are vacant lots or open fields nearby that can serve the same purpose. Quite often, these "barren" areas provide an excellent laboratory for the study of ecological relationships.

Exploring a Park (or a Vacant Lot)

- What plants dominate the area? (Don't worry about immediate identification, just describe the plants.)
- How are the plants distributed over the area? (Sparsely? Abundantly?)
- What characteristics do these plants possess that enable them to survive at this location?
- What kind of root system do these plants have? (How deep?)
- How many different kinds of plants can you distinguish?
- What plant-insect associations exist? (Relationship, if any?)
- Is there any evidence of bird or rodent life?
- What soil characteristics exist? (Relationship to plants?)
- How is this land now being used?
- Is there any evidence that this land is being abused?

At certain times of the year, a variety of seeds will be found in most vacant lots and parks. A series of lessons might flow from an investigation of how seeds are disseminated.

Investigating Seeds

How many different ways do seeds travel? (Based upon observation.)

- Gliders ◆ maple and pine
- Sailors ◆ coconut and sedge
- Parachutes ◆ dandelion
- Hitch-hikers ◆ pitchford and burdock
- Explosive ◆ pea and clematis
- Animal food ◆ apple and grape

Adopt a Tree

Offshoot learnings from the above investigations can lead to a study of how seeds germinate (some will not germinate if left in the cold); or a field trip to a nursery (still another type of outdoor laboratory) to observe which plants are grown and for what purposes.

Adopting a nearby tree (one tree per student) and recording monthly observations can aid in developing the concept of "treeness." Some guiding questions are:

- Where is the tree located? Describe its habitat.
- What is its general shape?
- What is the approximate height?
- Describe the relationship of your tree to other nearby trees, if any. Are there any similarities? Differences?
- How do the branches on your tree grow?
- Record the characteristics of your tree during the four basic seasons of the year. Draw a picture of the leaf. Of the flower. Of the fruit.
- Do you notice any evidence of injury or decay? What might have caused it? How could it have been prevented?
- What other plants live in or on the tree? (Algae, moss, lichens, fungi.)

- What animals live in or on it? (Birds, insects, other animals.)
- Can you judge its age? (The teacher might be able to obtain a tree core with an increment borer.)

After an appropriate period of time for study, the students might compare their findings and then explain the differences in their findings.

DESTINATION UNKNOWN HIKE

The learners use a compass, in this activity, to find their way into the unknown. All the elements of high adventure are contained in the Destination Unknown Hike.

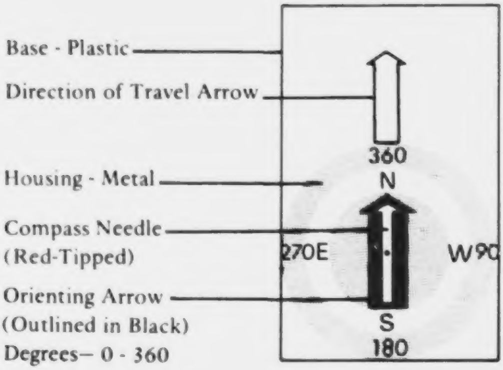
To organize the activity, the teacher divides the class into four small hiking groups. Each group will follow a different compass path. The trails are laid out in such a way that they all lead to the same destination. When the hikers start out with their own set of compass directions, they have no idea where the trail will lead, or where it will end. The only thing they know for certain is that if they follow the directions carefully they should all finish at the same spot. The overall pattern of directions could look like the illustration on page 92.

Before starting on the trail, the students will need to receive instructions on how to use the compass in order to follow a designated set of directions.

Instructions for using the compass to follow a designated set of directions.

- Hold the compass by its base, and turn the metal housing until the desired degree or direction is lined up with the "direction of travel arrow" in the base.
- Hold the compass level, with the direction of travel arrow pointing straight ahead (away from you). Turn yourself, holding the compass steady so that it turns with you, until the red-tipped compass needle and the black-outlined arrow are pointing the same way.
- You should be facing in the direction you want to go.

PARTS OF THE SILVA COMPASS

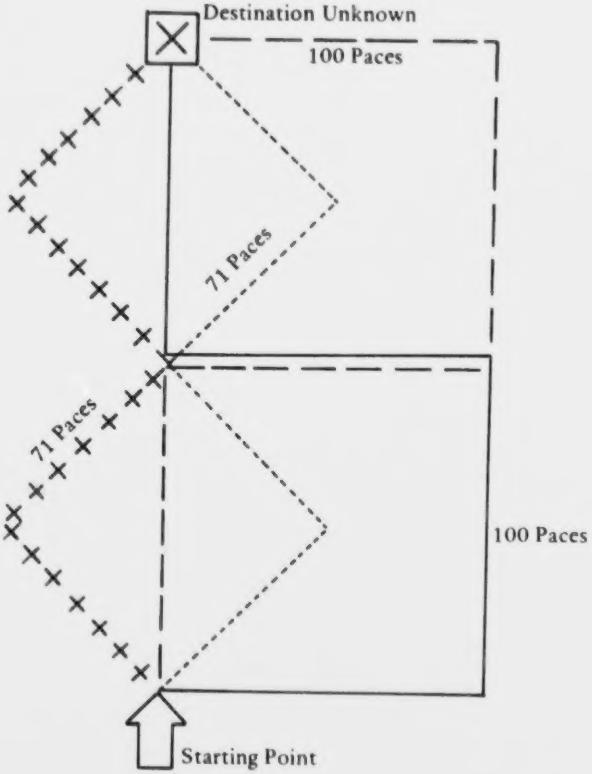

Base - Plastic
Direction of Travel Arrow
Housing - Metal
Compass Needle
(Red-Tipped)
Orienting Arrow
(Outlined in Black)
Degrees— 0 - 360
360
N
270E
W90
S
180

Courtesy, Silva, Inc., La Porte, Indiana

High adventure lies ahead as young pathfinders work their way toward "Destination Unknown."

There are four changes in direction of the Destination Unknown Hike, and each group should travel approximately the same distance. The compass directions for each team would look like this.

Team I ________	Team II — — —	Team III - - - - -	Team IV + + + + +
90° 100 paces	360° 100 paces	45° 71 paces	315° 71 paces
360° " "	90° " "	315° " "	45° " "
270° " "	360° " "	45° " "	315° " "
360° " "	270° " "	315° " "	45° " "

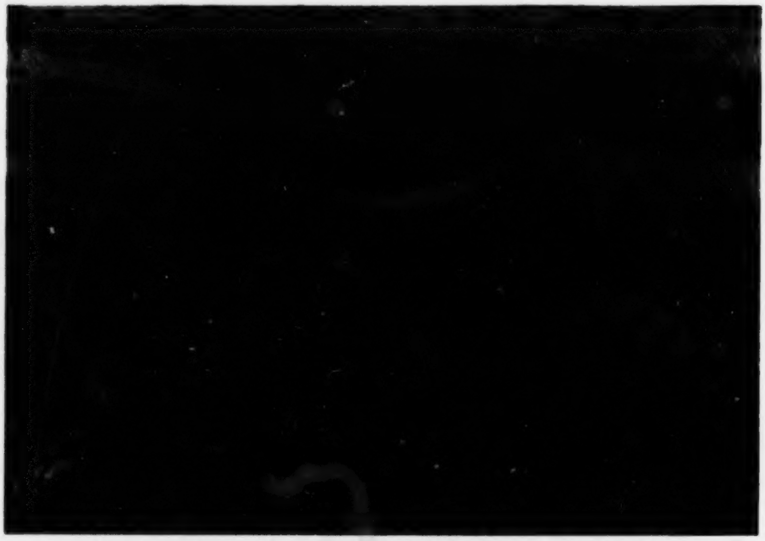

Destination Unknown
100 Paces
71 Paces
71 Paces
100 Paces
Starting Point

EXPLORING A STUDY PLOT

Many teachers find the study-plot exploration a very valuable experience that can be applied to most any outdoor area. The learner explores a particular site, or plot, to find out what is there and the interrelationships of living things. Through plot studies, comprehension of ecosystems, succession, and land uses may be related to any of the traditional subject-matter areas. Teachers quite often use activities in the plot study as a means for developing the basic process skills of observation, inference, communication, classification, computation, measurement, time/space relationships, and prediction.

URBAN ENVIRONMENT

Now that approximately 74 percent of the population in the U.S.A. lives on 2 percent of the land, people have become very concerned about the quality of their total environment—from the inner city to wilderness areas. One result of space exploration has been to cause humans to realize that their life-space and natural



Improving the environment is one way of contributing to a better society. (Courtesy Minneapolis Park and Recreation Board and the Minneapolis Public Schools.)

resources are finite—that we are all truly passengers on this spaceship called "Earth."

Urban areas, in particular, are plagued with complicated environmental quality problems such as air, water, and noise pollution; transportation congestion; lack of decent housing and community facilities; lack of recreational and open land; and inadequate water supplies and waste-disposal systems. The urban community, itself, is an ideal laboratory for the study of urban problems and potential solutions. Youngsters may experience many kinds of environmental encounters through investigations conducted in the city. Five of these encounters (and investigative questions), including air quality, transportation needs, solid-waste disposal, open-space planning, and energy needs, are presented here.

Air Quality

Visit the air pollution control district office for your city or area. If possible, take photographs from the same viewing spot on a clear day and again on a smoggy day.

- How is the quality of the air determined (measured)? (Amount and types of pollutants?)
- What are the sources of these pollutants?
- How does the quality of air vary during the day? Week? Month?
- What are the effects of air pollution upon people? Plants? Manufactured structures?
- What influence do weather and topography have upon air pollution in your area?
- What is the financial cost of air pollution per person per year?
- What is being done to control air pollution in your area? By which agencies? How? Cost? Effectiveness?

Transportation Needs

Identify major traffic intersections or arteries near your school. Work with teams of students to gather the following data at various times during the day.

- How many vehicles pass this point in one hour?
- How many of these vehicles carry one passenger? Two? Three? Four or more?
- How much noise is there at this intersection? (If possible, try to measure with a sound-level meter.)
- Can you smell any fumes from the vehicles?
- In your opinion, can this intersection/street carry this amount of traffic satisfactorily?
- Visit the office of the Director of Transportation to find out what plans are being developed to handle mass transportation of people in your community in the years ahead.
- If your community already has a system of mass transportation, are the citizens satisfied with its performance? Who supports the system financially? How much did it cost to establish the system? How many barrels of oil per year does it save?

Solid-Waste Disposal

Visit your community's waste-disposal plant in order to determine how it handles and disposes of municipal wastes.

- Is the garbage and trash dumped? Buried? Burned? Or what? Are there any benefits derived from these processes?
- Does your community have a curb-side recycling facility?
- Are the waste materials sorted in any manner? If so, how? Are these sorted materials recycled? Does this process save any money?

Open-Space Planning

Plan a visit with the Director of Recreation and Parks or the City Planner to gather information about open space available to your city. If possible, take an aerial field trip, and actually view the open space of your community.

- How many acres of permanent open space (e.g., military reservations; wildlife refuges; watershed lands; and city, county, state, or national parks) are available within a one-hour drive? One-half-day drive? One-day drive of your neighborhood?

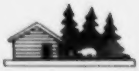
- Does your community (county, region, or state) have any policies regarding open space and recreation lands for the public? If so, how many acres of public recreation open space is recommended for 1,000 population?
- Have any studies been conducted to determine the recreation needs of the people in your area (e.g., hiking, camping, boating, fishing, horseback riding, etc.)? Is there sufficient space and facilities to meet these needs?
- Are there any plans on the drawing board for future needs? For the year 2000?

Energy Needs

Take a field trip to the offices of the utility company that serves your community. Talk with the information and/or education staff person, and gather information that will answer the following questions:

- How many customers does the company serve?
- What is the unit cost for electricity (kilowatt-hour)? For natural gas (therms)?
- Are there any incentives, offered by the utility company, for the customer to conserve energy?
- What energy source(s) are utilized by the company to generate electricity? If more than one, what percentage of electricity is produced by the various sources?
- Does the company have any plans for generating electricity by alternative methods? If so, which ones?
- What are the long-term energy needs projected by the utility company? How do they plan to meet them?

"A SHORT BUS TRIP" TO . . . A STATE PARK, NATIONAL FOREST, OR NATIONAL PARK



Depending upon the exact location of one's school, there may or may not be several large outdoor classrooms, within a short bus ride, in the form of a park or forest under the supervision and maintenance of a county, state, or federal agency. In addition to the previously described activities, these areas might offer opportunities for the exploration of a stump or fallen tree and layers of forest life.

A Stump or Fallen Tree

- How did the tree fall or how was it felled?
- Can you establish how long ago the tree fell or was cut down?
- How old was the tree when this happened?
- Was it down because of injury? Fire?
- What is the tree's diameter? Circumference?
- What things live on the stump or log now? Effect?
- What nonliving things are affecting the stump or log?
- What changes do you think have occurred or will happen in the environment now that the tree is down?
- Develop a diagram illustrating the energy cycle surrounding the stump or log.
- Explain the value of a stump or fallen tree in a forest.
- Why is it important to not tear the stump or tree apart?
- Communicate your feelings about this encounter with a stump or fallen tree in one or more of the following ways:
    - Writing. (The teacher might instruct you to use haiku or cinquain.)
    - Sketching. (You may wish to use charcoal, water colors, or ink.)
    - Photographing.

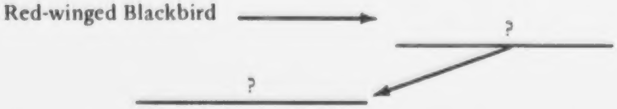
Layers of Forest Life

To the untrained eye, a forest sometimes appears to be merely a disorganized collection of plants and trees. Closer inspection will reveal various patterns or layers. Animals also live in this "apartment house" of the plant kingdom. Some animals remain in just one layer of the forest for their entire life; others move about freely. A table, similar to the one illustrated here, may be used to collect data about life in a forest.

Forest Layer or Floor	Which Plants Are Found?	Which Animals Are Found?
Canopy/Penthouse		
Understory/Top Floors		
Shrub Layer/Middle Floors		
Herb Layer/Lower Floors		
Forest Floor/Lobby		
Under the Ground/ Basement		

Some additional investigations, associated with the study of a forest, are:

- Temperature comparisons ♦ Place at least four thermometers in various zones of the forest and in a nearby open field. (First make sure the thermometers are working properly by placing them all in the same location at once to see if they all read the same.) Record the temperatures on an overcast day. On a cloudy day. On a clear day. Are there any differences? Why?
- Food chains ♦ From your observations, can you determine what feeds upon what? Diagram your findings with connection arrows. For example:



- Ecological relationships ♦ Summarize the interrelationships of this community with the assistance of the following guide questions:
  - What producers are in the community? Are these producers rare? Abundant?
  - Which group contributes the most to food production?
  - Are there layers of producers? What are their relationships?
  - Which consumers are in the community? What are their relationships?
  - Is there any evidence of "predator-prey" or "parasite-host" relationships?

SPECIAL AREAS

Farm

Many schools are located in areas where there are opportunities to take field trips to unusual types of learning environments. Each one of these examples offers unique learning possibilities and the use of an inquiry approach. A field trip to a farm might enable urban dwellers, especially, to gain some insights into the complex aspects of operating a farm and of the interdependence of the farmer and the city dweller.

- How large is the farm?
- How far from your school is the farm?
- What does the farmer grow or raise on the land? How much?

"Only one ear of corn per stalk?"

- Do any animals live on the farm? What kind? How many?
- Is the farmer troubled by predators or pests? How are they controlled?
- When does the farmer harvest what is grown?
- Where are the products sold? How much does the farmer receive for them on a unit basis?
- What kinds of assistance (machinery and service) does the farmer receive?
- Does the farmer apply any conservation practices? Which ones? Why?
- How does the work of the farmer help us?
- How has the way farming is done changed over the past 20 years?
- What types of fertilizers are used, if any? How much is used? What is the cost? How does it influence the growth of crops?

Lumber Mill

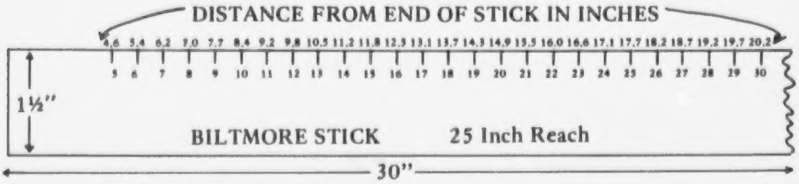
A lumber mill is another fascinating place to visit. The number of different operations involved in processing the "raw" saw log into finished pieces of lumber is a real "eye-opener" for teachers and students alike. The following questions may serve as a guide to what can be learned on a field trip to an operating lumber mill:

- What kinds of trees are here? Where did they come from?
- What happens to a tree from the time it is cut until it reaches the mill?
- Why are the logs separated?
- Why are the logs kept moist?
- Why is there a pond? How many logs are in the pond?
- Who has one of the most important jobs in the mill? Why?
- How is the lumber transported from the mill? Where does it go?
- What is the cost of the lumber at this mill?
- What effect does weather have upon the timber industry?
- What is being done to replace the trees that are harvested?

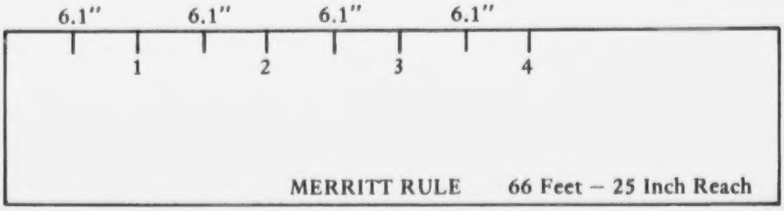
A novel problem-solving exercise during a trip to a lumber mill, a tree farm, or a forest is to estimate the number of board feet in a tree (or log). The first step is to calculate the height and diameter of the tree.

The Biltmore stick, with a Merritt rule on the reverse side, is a handy teaching aid for determining the diameter and height of trees. This instructional tool is easily constructed from a straight piece of wood 30 inches long, 1½ inches wide, ½ inch thick, and beveled on one edge.

It is graduated along the unbeveled edge (see illustration).


DISTANCE FROM END OF STICK IN INCHES
4.6 5.4 6.2 7.0 7.7 8.4 9.2 9.8 10.5 11.2 11.8 12.5 13.1 13.7 14.3 14.9 15.5 16.0 16.6 17.1 17.7 18.2 18.7 19.2 19.7 20.2
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1½"
BILTMORE STICK
25 Inch Reach
30"

The Merritt rule gradations for the reverse side of the stick are as follows:


6.1"
6.1"
6.1"
6.1"
1
2
3
4
MERRITT RULE
66 Feet – 25 Inch Reach

Each gradation of 6.1 inches on the Merritt rule represents one 16-foot log. To calculate the number of 16-foot log lengths in standing timber:

- Take a position 66 feet from the base of the tree and approximately the same elevation as the tree base. Hold the stick vertically at a distance of 25 inches from your eyes.
- Sight over the zero end of the stick so that it is in line with the upper limit of usable timber.
- Without moving the stick or your head, sight along the rule to the base of the tree (12 to 16 inches above ground level is about right). Read directly from the rule the number of 16-foot logs or fractions of logs in the tree.

The Biltmore stick is also used for calculating the diameter of standing timber. Follow these steps:

- Hold stick horizontally at a distance of 25 inches from your eyes, and place the beveled edge against the tree. Diameter measurements are taken at chest height, or 4½ feet, from ground level.
- The zero end of the stick should be in line with the left edge of the tree trunk. Holding your head still, sight over the stick to the right-hand edge of the trunk.
- The diameter is read directly from the stick at the point where your line of vision meets the right-hand edge of the tree.

Then, once you know the type of tree, refer to specially prepared charts that indicate the number of board feet. If the current market price per board foot for that particular kind of wood is known, it requires merely a simple calculation to determine the value of that tree.

A COMPOSITE VOLUME (BOARD FEET) TABLE

Tree Diameter (inches)	Number of 16-foot logs				
	½	1	1½	2	
10	21	39	54	68	
16	59	105	147	180	
20	92	170	236	295	Douglas Fir
26	158	300	410	510	$165.00/1000 Bd. Ft.
30	220	410	550	685	
36	333	600	820	1010	
40	415	745	1010	1250	

Following is an example:

> A student estimates that a certain tree will yield 1½ sixteen-foot logs. The estimated diameter of the tree at chest

height is 36 inches. At the rate shown in the table, what is the estimated value of that particular tree?

Rate: $165.00 ÷ 1000 = 16½¢ per bd. ft.
Value: 820 bd. ft. × 16½¢ = $135.30

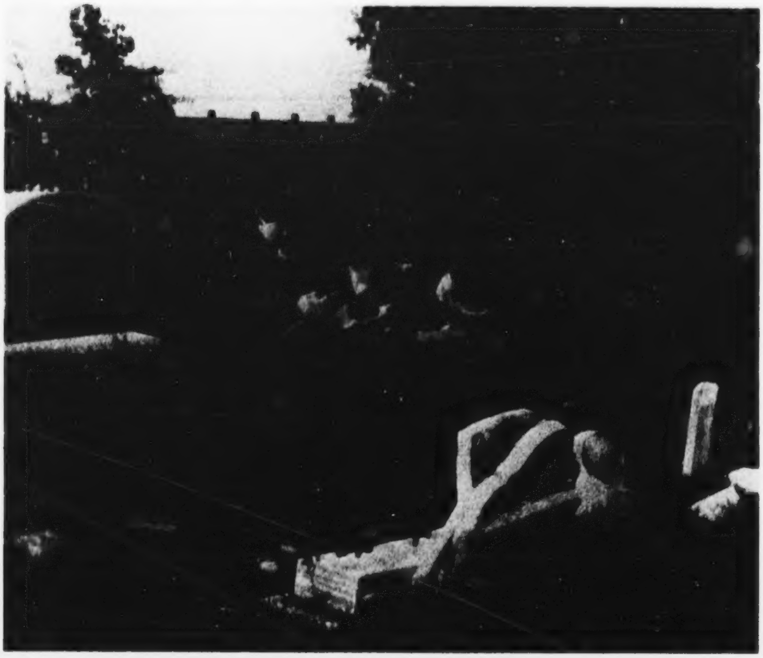
Fish Hatchery

Youngsters frequently fish in recreation areas, unaware that many of the fish they catch are raised in a fish hatchery. Many states maintain fish hatcheries and welcome educational groups to tour their facilities. As a result of observing, reading display materials, and talking with the guide, the following questions might be answered:

- What type of fish are raised at this hatchery?
- What are the troughs for? Where do the eggs come from? How long do they take to hatch?
- How are the fish cared for in the hatchery? What are some of the problems in raising fish to a catchable size?
- What effect does the water temperature have upon the length of the incubation period? On the rate of growth?
- How many fish are raised in one year?
- What happens after the fish hatch?
- How much food do the fish eat?
- How are the fish moved to the ponds?
- What are the different methods of planting fish?
- How are the fish transported to the planting areas?
- How much does it cost to raise an 8-inch fish? Where does the money come from?
- How many fish are caught per year? How many fishing licenses are sold in your state per year?
- What laws does your state have to protect fish? Who enforces the regulations?
- What are some safety rules to follow when fishing?

Cemetery

Many communities have an "old" or "historic" cemetery nearby that can prove to be very educational by revealing much



Another approach to studying local history.

information about the culture of the people who lived there earlier. Recognizing the fact that burial grounds have always been considered sacred, visitors should treat a cemetery with respect and care. Permission should be sought, if possible, before making a visit with a large group. Small investigating teams may prove to work very effectively in seeking answers to the following guiding questions:

- When was the cemetery founded?
- Who was the first person buried? When? What was the age at time of death?
- How long has it been since someone was buried in the cemetery?
- What kinds of markers are used on the graves? Are these materials local to the area or transported from elsewhere?

- Can the history or family tree of certain families be traced from the grave markers?
- How many different nationalities or countries are represented within the cemetery?
- What was the average life span of people in this community?
- Is there any evidence of plagues, epidemics, or wars?
- Over the years, were there any changes in the types of markers used? In the designs? In the shapes? In the styles of epitaphs?
- Are all the inscriptions visible? What kinds of stones show weathering? (Making rubbings of inscriptions on gravestones might be an interesting activity.)
- Do the graves all face the same direction? Why?
- Who lived longer in this community, men or women?
- Can the economic status of a family be determined in any manner?
- What feelings do you have about those people who are buried in this cemetery?

PACKAGED PROGRAMS

During the past 10 years, "packaged" programs, or curriculum activity kits, related to environmental, conservation, and outdoor education have been developed by various organizations, agencies, schools, and special interest groups that have made it easier for teachers and recreation leaders to find suitable learning experiences and activities for their classes, or groups.

Four of those programs that have received national attention are explained here. They include Environmental Education Teaching Resources, Investigating Your Environment Series, Outdoor Biology Instructional Strategies (OBIS), and Project Learning Tree (PLT).

Environmental Education Teaching Resources

A unique packet of materials titled "We Can Help!," produced by the United States Fish and Wildlife Service, Department of the Interior, contains indoor and outdoor activities for both elementary and secondary students. In addition to 24 outdoor classroom guides that describe environmental investigations, there are 5 guides that will aid in the creation and development of an effective program.

- Notes on Coordinating a Community Program in Environmental Education
- Educational Use of Public Lands—A Course for Resource Managers
- Environmental Education Methods for Teachers—Setting Up a First Course for College Credit
- Face to Face—Building Program in Environmental Education
- We Can Help! A Teacher's Guide to Environmental Education Activities

Each activity guide contains the following:

- Synopsis ♦ Briefly describes the activity.
- Purpose ♦ Identifies general areas of information and skills contained in the investigation.
- Objective ♦ Designates the activity goals that the students participating in the activity can achieve.
- Materials ♦ Lists equipment and supplies that are necessary in order to complete the investigation.
- Description ♦ Describes the investigation in sufficient detail so that the user can follow the procedure step-by-step.
- Data Sheet ♦ Contains a removable sheet on which students record their findings.
- Using the Data ♦ Suggests activities and discussion questions.
- After the Investigation ♦ Offers suggestions for activities to develop the investigation further for the entire class and provides independent study material for those students with a continuing interest.

The outdoor classroom guide for insects and plants appears on pages 108 and 109.

environmental goals

Every citizen's decision, or lack of decision, in some way determines the use and the future of public lands.

The U.S. Fish and Wildlife Service is this Nation's only Federal land management agency solely responsible for fish and wildlife. It is the Service's belief that through education and direct experience, citizens can gain information, understanding and attitudes that will support wise use of public lands.

Maintaining environmental harmony is a crisis concern of the Service. Man must continue to live in the world in some reasonable ''balance'' with the land and with other life, otherwise he will not survive.

Service programs help people to learn about land and wildlife, involve themselves in interactions with the natural world, and enrich themselves through that strange aesthetic joy which can be experienced in the midst of a wild environment. Besides these, the Service attempts to make its lands a model of environmental management.

Quality and harmony will remain a part of the environment and remain the guidelines for public land management if citizens see value in these practices.

background

Did you ever wonder why there are so many different kinds of the same thing? There are numerous kinds of flys, beetles, worms, algae, bacteria, trees, snakes, frogs, fishes, birds and mammals.

It may seem that animals of the same kind, such as sparrows, all behave about the same way. This is not true.

Insects and plants

A. **Purpose**: This activity will acquaint students with—

1. The variety of plants and insects that exists in semi-natural ''weedy'' area.
2. The variety of plants and insects that exists on a lawn.
3. A way to collect, display, and compare samples of plants and insects.
4. The construction of an insect net.

B. **Objectives**: During this activity students will—

1. Compare an area where plants and insects are diverse with an area where they are not.
2. Make inferences about what causes this diversity.
3. Make a display of plants and insects to illustrate the concept of diversity.

C. **Activity requirements**: Each student, or pair of students, will need—

1. Materials to make an insect net: broom handle or equivalent, panty hose, coat hanger, pliers, needle and thread, extra wire.
2. Killing jars: baby food jars with caps, cotton soaked in fingernail polish remover or alcohol.
3. Grocery bag to contain plants.

The class will need—

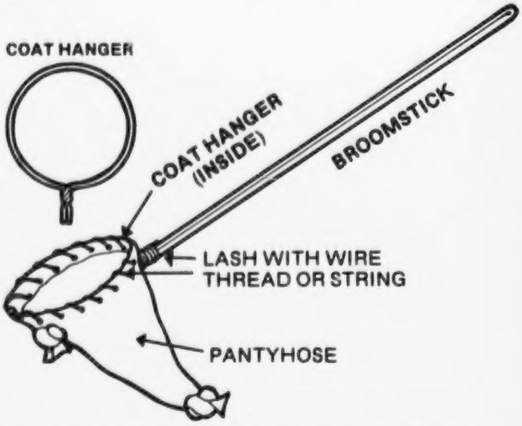
1. Large pieces of white paper for displaying insects and plants.
2. White glue.
3. Felt-tipped markers.
4. Golden Series on Insects.

Introduction

On a local scale the concept of diversity can be studied and understood by students. This activity suggests a way to compare an unmanaged, weedy roadside with its plant and insect life and a managed and manicured lawn with its lack of plant and insect diversity.

Before You Begin

Each student can make a net, or if students will be working in teams of two they might make one net for each pair. (See illustration.) Follow this procedure:



- Remove the elastic waistband from the pantyhose;
- bend the coat hanger into a circle of at least 10 inches in diameter, and twist the ends around each other securely;
- fold the upper edge of the hose over the circle at least 1 inch and whip stitch with needle and thread;
- knot one leg tightly at the very top and cut it off below the knot;
- knot the other leg at the knee or below;
- lash the twisted ends of the coat hanger to the broom handle (or stick) with an extra length of wire.

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When one observes different species of sparrows, it is discovered that each species behaves differently than the others. It may differ in when and what it sings; what, when and how it eats; when and how it nests; how it flys and walks; etc.

Because of the diversity of plant and animal life in the environment, each species of sparrow has been able to "put together" a unique composite of behaviors or niche. Since the niche of each species of sparrow is unique, sparrows of different species are not competing directly with each other. This allows several different kinds of sparrows to live in the same place.

And so it is with most animal life — a diverse environment with diverse plant life allows for a diverse animal life. Diversity then, creates a complex fabric of interrelationships among the environment, plants and animals. This fabric is both flexible and durable. Even in the face of disaster caused by floods or fires or hurricanes, some of the fabric remains to begin again.

Many things can affect the natural diversity of the environment. Modern agriculture has turned the diverse native prairie into a domestic prairie of corn and wheat. What effects has this had on prairie animal life? This activity may help answer this question.

Planning the Activity

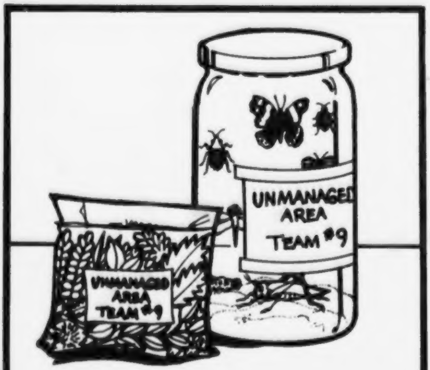
Locate two areas to compare with one another; one managed by people and one unmanaged, weedy, and large enough to allow the class to work in teams of two with plenty of space for each team. An undisturbed roadside or railroad right-of-way are good possibilities. The managed area might be a grassy area of the school grounds.

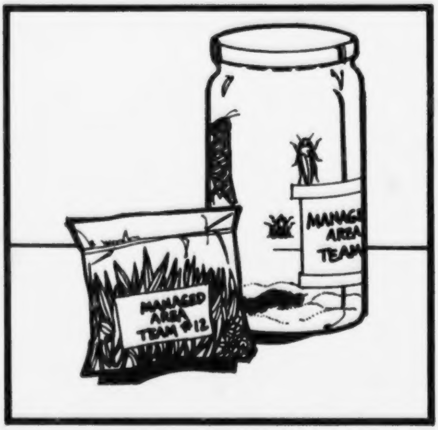
In order that comparisons between the two areas be accurate, the class should decide how many sweeps with their net each team will make in each of the two areas (4 or 5 sweeps is suggested). Decide, too, how much time will be spent looking on the ground in each area for crawling insects (5 minutes is suggested). Finally, decide how many different plants to collect at each area (5-10 is suggested).

Activity Description

When the class arrives at the weedy area, assign each team to a generous space. First teams should collect one example of each of 5 or 10 plants, pick the plants at ground level, place them in a bag, and mark the bag with their names. Then they should make the agreed upon number of sweeps with their nets, being careful to sweep at a different level and a different place each time. Next examine the ground for crawling insects, and collect them for the length of time agreed upon. Transfer all insects to killing jars, and mark the jars with team names and location. Leave the insects in the jars for at least an hour.

The procedure can be repeated when the class moves to the school lawn. Here, all sweeps will have to be made at grasstop level. Spend the same amount of time collecting crawling insects. Again, transfer to killing jars and mark the jars. In collecting plants, it may be impossible to locate 5 to 10 different kinds. Perhaps students will have to collect 5 to 10 grass plants.





Investigating Your Environment Series

The approach and philosophy of the teaching and learning process in these materials, produced by the USDA Forest Service, were initially developed and field tested in the late sixties and early seventies by a group of educators and resource agency people in Oregon and Washington. This group believed that "living in an environment becomes a little easier if we understand what makes up that environment and how our actions affect it." The teaching/learning process and techniques emphasized in this series of lesson plans were designed to enable students to actively examine various components of the environment and to help them understand the interrelationships of these components.

Each lesson plan consists of six sections:

- Suggestions for setting the stage.
- Individual or group activities.
- Task cards for some activities.
- Charts and tables to be used in data interpretation.
- Suggested questions, discussions, and summaries.
- A statement of anticipated behavioral outcomes.

These investigations of soil, water, forest, range, and animals, for example, encourage students to observe their surroundings and to collect, record, and interpret data. The various facts and figures are not collected as an end in themselves but rather are utilized as a means toward gaining a better understanding. Each lesson is designed to maximize participation of the learning through hands-on activities, questions, and discussions. The lesson on "analyzing soil data," on page 111, illustrates these principles.

Additional information is available from Environmental Education Specialist, Forest Service, USDA, 630 Sansome Street, San Francisco, CA 94111.

Outdoor Biology Instructional Strategies (OBIS)

OBIS activity packets are the result of a National Science Foundation grant to the Lawrence Hall of Science of the University of California–Berkeley. These "packaged" modules provide schools and community-sponsored youth organizations with learning activities for use at common outdoor sites, such as lawns, city

SOIL INVESTIGATION TASK CARD

TASK D (individuals or small groups)

ANALYZING SOIL DATA

Using the soil data you collected and the information provided in the soil data tables on the other side of this Task, complete the following.

1. On the basis of soil depth, complete the following (refer to Table I).
   The potential of my soil for water storage is ______________________________.
   Why? ______________________________.

2. On the basis of color, complete the following (refer to Table II).

   a. The top soil, or A horizon:

      Amount of organic material ______________________________.
      Erosion factor ______________________________.
      Fertility ______________________________.

   b. The drainage in the subsurface soil, or B horizon, is: ______________________________
      ______________________________.

3. On the basis of texture, complete the following (refer to Table III).

Layer or horizon	Water holding capacity	Looseness of soil
Topsoil A		
Subsoil B		

4. On the basis of structure, complete the following (refer to Table IV).

Layer or horizon	Penetration of Water	Drainage	Aeration
Topsoil A			
Subsoil B			

5. On the basis of pH ranges, complete the following (refer to Table V).

Some plants that could grow here according to the soil pH plant chart	Some plants actually observed growing here

   How well did the plants in the study area check out with the pH you measured?

   Describe in a short paragraph how you would set up an experiment to collect data and construct your own soil pH plant chart.

6. On the basis of the soil temperatures, complete the statement below (refer to Table VI): The plants on my soil have ________ growth taking place now. I predict that in 3 months the growth conditions of the soil, on the basis of soil temperature, will be ____________.

7. Write a soil description about this soil using the words from the data you collected and recorded on the soil micromonolith card. Compare this description with the one you wrote at the beginning of the session.

SOIL INVESTIGATION Task Card

Courtesy, Forest Service, USDA

lots, local parks, streams, ponds, and the schoolyard. Although these 100 activities were designed primarily for youth 10 to 15 years of age, both younger and older people have enjoyed and benefited from OBIS activities. The various activities and modules may be used independently, or combined in a sequence, to create a program to meet any specific need.

The major purpose of the OBIS materials is to help youngsters and adults to better understand and appreciate the ecological relationships in their local environment. OBIS encourages discovery by the student in the context of an interesting and enjoyable experience in the outdoors.

Each activity folio provides the following:

- Overview ◆ Explains what the children do in the activity.
- Bio-Key ◆ Identifies the teaching techniques and the basic concepts emphasized in the activity: for example, game simulation, controlled experiment, and adaptation.
- Background ◆ Explains the biological and other information that will be needed to conduct the activities.
- Challenge ◆ Sets out the basic task for the children; for example, "Find your secret partner before the 'predator' captures you."
- Materials ◆ Lists all the materials that will be needed to conduct the activity.
- Preparation ◆ Describes time and/or site requirements, optimal group size, and any necessary preparation of materials.
- Action ◆ Outlines the suggested step-by-step activity procedure.
- What Do You Think? ◆ Contains additional questions for discussion that enlarges upon the children's experience and highlights the biological significance of the activity.
- Branching Out ◆ Offers follow-through activities that expand on or reinforce the basic concept.

Currently, there are OBIS modules with the following titles:

- OBIS Sampler
- Adaptations
- Animal Behavior
- Aquatic Animal Behavior

- Backyard
- Bio-Crafts
- Breakwaters and Bays
- Campsite
- Child's Play
- Desert
- Forest
- Human Impact
- Lawns and Fields
- Trail
- For 8-11 Year Olds
- For Large Groups
- For Small Groups and Families
- Games and Simulations
- Neighborhood Woods
- Nighttime
- Outdoor Study Techniques
- Pavement and Parks
- Ponds and Lakes
- Schoolyard
- Seashore
- Stream and Rivers
- Wintertime

A few of the activity titles, designed to capture the children's interests, are:

- Who Goes There?
- Litter Critters
- Sound Off!
- Damsels and Dragons
- Sticklers
- Great Steamboat Race

One of the activity folios from the Pavement and Parks module, "Envirolopes," appears on pages 114 and 115.

Additional information is available from Delta Education, Box M, Nashua, NH 03061.

BACKGROUND

Many people enjoy walks in the outdoors. An awareness of the diversity of nature can enhance the aesthetic appreciation and personal value of such walks and lead to biological inquiry. The color of fall leaves; the fragrance, shape, and color of spring flowers; and the textures and patterns of trees, ferns, and mosses are only a few examples of the variety found in the outdoors.

Envirolopes focuses on the diversity of nature in almost any outdoor setting: along a trail, around a science center or school, at a camp, or on a family outing. This activity works well with mixed-aged groups and encourages the participants to develop the ability to make observations and share them with others.

MATERIALS

For each team of two:

1 letter-sized envelope with a challenge on the front

optional: several pieces of colored yarn or cloth*, a different color for each team (See the "Preparation" section.)

For the group:

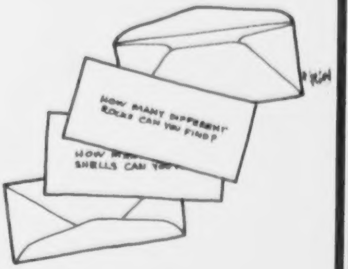
1 "Envirolope Challenges" card*

glue or tape*

scissors*

* Available from Delta Education.

CHALLENGE: FIND A VARIETY OF COLORS, TEXTURES, ODORS, SHAPES, ORGANISMS, OR EVIDENCE OF ORGANISMS.



PREPARATION

Group Size. This activity works well with both small and large groups of almost all ages (over five years old).

Time. Plan on thirty to forty minutes for this activity.

Site. Select a site where collecting small samples of leaves, rocks, twigs, or shells is permitted. Picnic tables, sidewalks, or lawns are good places to spread out the envirolope collections for the group discussion and observation game.

Envirolopes. Make a copy of the "Envirolope Challenges" card. Select the challenges that are appropriate for your site and group, or make up some of your own. Cut the challenges apart and adhere one to each of the envelopes.

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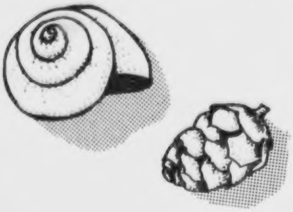
ENVIROLOPES

BIO
KEY

Observation
Variety
Comparing



Envirolope Challenges. Possible challenges include:

- Find at least five different textures.
- Find at least five different odors.
- Find the five most unusual-shaped leaves.
- Find at least five different kinds of seeds.
- Find at least five different-colored objects.
- Find at least five different kinds of evidence that animals are around, such as a leaf with bites taken out of it or a feather.
- Find at least five different kinds of evidence that people are around (trash, for example).
- Find at least five different kinds of rocks.
- Find at least five objects with different shades of brown.
- Find at least five objects with different shades of green.

For seashore sites include:

- Find at least five different kinds of shells.
- Find a shell that has five different colors on it.

Flagging. If regulations or a fragile habitat preclude collecting, you can use the flagging technique. Use a different color of cloth or yarn for each team. The teams should attach flags to or near the objects that meet their challenges. If you use this method, the group will have to walk around the site to discuss the choices.

ACTION

1. Point out the boundaries of the activity site to the group. Show everyone an example of an envirolope challenge, and discuss how the challenge might be met.

2. Divide the group into teams of two, and give each team an envirolope. Give the teams twenty minutes to search for samples that meet their envirolope challenges. Make a rule that each team's samples must fit in the envelope.

3. Circulate among the teams as they search, encouraging them to investigate further. Offer encouragement or assistance when necessary.

4. After a twenty-minute search period, ask the teams to display their collections and look over each other's finds.

WHAT DO YOU THINK?

1. What objects appeared in more than one collection?

2. Did you find more evidence of animals or of people? What types of evidence do animals leave? What types of evidence do people leave?

3. Which was the most difficult challenge to meet?

4. Which item, because of its variety of properties, could be included in the largest number of individual collections?

Note. Keep discussions short. However, if a discussion wanders from biology to art or to some other form of creative expression don't feel that you have to turn the discussion back "on course." Such interest is the key to developing environmental awareness and appreciation.

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Project Learning Tree (PLT)

This environmental education project, jointly sponsored by the Western Region Environmental Education Council and the American Forest Institute, has developed two activity guides that provide learning activities for students in both the elementary and the secondary grades. A conceptual framework for environmental education has been developed that will engage students in an interdisciplinary exploration of the concepts underlying the various disciplines, such as mathematics, natural and physical sciences, humanities, and the social sciences. The various activities may be used to complement the existing course of study, or it may be used as a complete unit of study by themselves. An example of a representative activity found in the PLT activity guides is on pages 117 and 118.

Each of the PLT activities is presented in a similar format, consisting of the following components:

- Subject Area
- Grade Level
- PLT Principle
- Concepts
- Skills/Processes
- Objective
- Activity Description
- Variation of the Activity
- Extension Projects

The various activities are indexed according to the PLT principles of the conceptual framework.

- Environmental Awareness
- Diversity of Forest Roles
- Cultural Contexts
- Societal Perspectives on Issues
- Management and Interdependence of Natural Resources
- Life Support Systems
- Lifestyles

Seed Dispersal

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OBJECTIVE

Students will be able to identify varying methods of plant seed dispersal.

ACTIVITY

Ask students to collect plant seeds from the school yard, their neighborhoods, their homes, and other places to be used as classification material. They may begin by investigating a small, measured area, picking up any seeds they find on the ground. An interesting method of collecting clinging seeds is for the students to make dry flannel leggings to wear walking through a field or vacant lot full of seed-bearing plants. Another simple and effective means of collecting clinging seeds is to drag a cloth fabric through such an area. Other students have walked through such an area wearing socks and no shoes! Students might put out some sort of retrievable, sticky substance — like strips of masking tape to cover a small, square area with the tape showing sticky side up. Such an apparatus is one possible way to catch seeds. Encourage the students to invent simple, effective seed-gathering techniques which do no harm to the environment.

Ask the students to look to see whether they can identify the means by which various plants disperse their seeds. The students can then invent their own system for classifying what appears to them to be different means by which these seeds are dispersed by the parent plants. Discuss with the students various dispersal methods until they become familiar with general classification terms, such as airborne, clinging, dropped, and propelled.

SUBJECT
Science

GRADES
4-6

PLT PRINCIPLES
- 6 Life Support Systems
- 5 Management and Interdependence of Natural Resources

CONCEPTS
- 6.5 Interdependence of Living Things and Their Environment
- 6.52 Heredity and Environment
- 5.21 Plants As Renewable Resources

SKILL
- 1 Gaining Information

Courtesy,
American Forest Institute
1619 Massachusetts Avenue, N.W.
Washington, DC 20036

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(Continued)

Ask the students, working in groups of three to five, to classify the seed samples into general types. You might try to supply at least one sample of each type to each group.

Once each of the groups has classified their seeds according to methods of dispersal, all of the students may discuss:

What each of the seed types has which allows it to disperse.
Why seeds must be dispersed.
Different possible ways one seed might be dispersed, and what value there might be for seeds to be dispersed in various ways.
How far it seems a seed could be dispersed, whether some seeds might be able to go farther than others, and what possible value this might have.

EXTENSIONS

1. Encourage students to bring unusual seeds they have found to class. Perhaps some students can think of examples of unique seed dispersal methods such as the waterborne method of coconuts.
2. Students might invent a seed dispersal system for some ideas related to the environment that they value.
3. Suggest that the students plant some of their seeds, using this renewable natural resource as the basis for further study.

A similar guide is available for grades 7 through 12. Additional information is available from American Forest Institute, 1619 Massachusetts Avenue, N.W., Washington, DC 20036.

SUMMARY

Only one's own imagination limits the "what" and "where" of teaching in the outdoors. Any outdoor environment, such as a crack in the pavement, a roof-top garden, a city dump, a botanical garden, a mountain forest, or a meadow pond, contains numerous learning opportunities that span the total school curriculum. Teachers who fail to develop the skills and techniques necessary to utilize the outdoor laboratory as one of many instructional environments available to their students are limiting the richness of learning opportunities for their classes.

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CHAPTER 5

Resident Outdoor Education Programs

THE RESIDENT outdoor education experience involves teachers and students in a program of activities related to the school curriculum in an outdoor setting for a period of several days. The resident site may be a facility belonging to a school district, a church group, the park district, the county, a university, or a private concern. Although decisions regarding the establishment and functioning of a resident outdoor education program may be governed by local regulations or state laws, many of the facets of this special type of educational program are similar for all regions. There are a variety of organizational patterns, which may be considered for a resident program, and the unique values of the resident program to the teacher, student, parent, and community are important considerations in the selection of a particular type of program. The planning process is a sequence of separate, but overlapping, steps for the educational leader(s) to follow in developing a resident outdoor education program. This chapter highlights the important aspects that will lead to the well organized resident program.

BENEFITS OF RESIDENT OUTDOOR EDUCATION

Involvement in the total-living situation of the resident outdoor education center provides numerous positive experiences, many of which cannot be measured in terms of tangible results.

Arriving for several days of living and learning at the outdoor school.

Teachers are involved in working and caring for students in a way that the traditional school day does not permit. The "living together" situation allows classroom teachers to observe students under a variety of new conditions—educational, social, and personal—which enables them to get to know the individual students better. Under these circumstances, an entirely new student-teacher relationship is possible, and understanding and mutual appreciation are bound to be established.

Values to Teachers and Students

For the students, the resident outdoor education experience provides a goal-oriented situation toward which they can work as a group. Positive values include the cohesiveness and the unity of spirit that result when individuals are pursuing a common goal.

Children are provided the opportunity to develop independence and self-reliance, when assuming responsibility for their own well-being. The tasks of making beds, cleaning areas around cabins or the dormitory, and deciding what equipment and clothing will be needed for the day fall to each child. Often, deci-

Social-living skills are enhanced at the resident outdoor education center.

sions must be made by individual students or student groups as to how dining hall efficiency, that is, setting up or cleaning up, can be maintained. These responsibilities not only are for the benefit of the decision makers but also are essential for the well-being and smooth functioning of the entire group.

Planning and working with peers on educational activities and investigations are valuable experiences provided by the resident program. Children enjoy the total involvement, and they realize that they are part of a compelling, natural learning situation, when they describe outdoor education as "real" and "meaningful" experience. Enjoyment of the learning process is the basis for developing a positive attitude toward schooling and lifelong learning in the child.

Value to Parents and Community

The resident outdoor education program works toward the development of the responsible young citizen. In aiming to develop personal responsibility, interest in learning, group cohesiveness and cooperation, awareness of new educational pursuits, and the introduction to new recreational activities, the resident program goals are consistent with the personal, social, and educational goals of the family and the community. Away from the routine of daily living, the student can become aware of some alternative choices for pursuing learning, for getting to know the "outdoor environment" better, and for leisure-time activities. Television, electronic games, radios, and other devices that occupy a child's attention are left behind; group problem-solving activities, investigations of the outdoor environment, group games which stress working together and having fun, campfire programs with sing-alongs and square dances, and caring and sharing types of activities become the main focal points of the outdoor education program.

PATTERNS OF ORGANIZATION

A review of organizational patterns reveals a wide range of program planning, staffing, and financial practices and arrangements. There are many good ways to conduct a resident outdoor education program.

The prospect of developing a resident outdoor education program can be quite overwhelming at first glance. The question of which type of program is best suited for a particular group, along with the planning and development for such an endeavor, becomes a giant hurdle in what can appear to be a monumental task. The process of developing a resident outdoor education program, however, is simply a series of basic, decision-making steps, which can be dealt with easily by approaching them one step at a time.

The following set of guidelines was established in order to view the planning process as a sequence of separate, but overlapping, tasks for the educational leader to follow in working toward a comprehensive plan for developing a resident outdoor education program.

Step One ◆ Select a Person or Persons to Act as Coordinator/Decision Maker

The person or committee designated for this task should be responsible for all aspects of the research, planning, and decision making for the groups that will be involved in the resident program and should have flexibility in scheduling to allow for site visitations, staff meetings, phone calling, and planning with parents, students, teachers, and resident staff. By designating the same individual or individuals to serve on the project throughout the planning and implementation stages, the communication link between the outdoor education center and the school staff is likely to be maintained.

Step Two ♦ Determine Objectives for the Resident Experience

This is a critical stage. A great deal of thought should be given to this step before any other decisions are made. Resident outdoor education programs typically range from one-half week (two nights) to a full week (four nights) in residence. If the shorter time period is selected, then careful consideration of program priorities becomes essential. Social relationships, development of self-concept and self-esteem, extended use of the outdoor environment for reinforcement of academic content, extension of the realm of experience, development of creativity, enhancement of group-living experiences, educational enrichment, and development of increased awareness of the environment are typical reasons given for participating in resident outdoor education programs. Obviously, in a relatively short time period, even a week is barely long enough to work toward the achievement of two or three of the major program objectives.

Step Three ♦ Identify Financial Considerations

Funding the experience is a primary concern. In a few situations, the board of education budgets the outdoor education program as an essential component of the school curriculum. In other instances, parents pay the major portion of the expense, with the board of education, parent-teacher organizations, and fund raising projects offsetting the remainder of the cost. Program expenses include transportation, food and lodging, equipment, and staff assistance.

Step Four ♦ Determine Staffing Needs

Classroom teachers should be capable of handling teaching responsibilities in the outdoor environment, once they are familiar with the outdoor site and have acquired a few special teaching techniques. Often a school will draw upon the services of instructional staff from the outdoor center to provide a smaller student-teacher ratio or to expand the program offerings. Some outdoor education centers offer training sessions or workshops for teachers to help them prepare for teaching in the resident program. A minimal ratio of one teacher per class is permitted by some centers; others require a 1-to-10 ratio of teachers/adults to students. An ideal ratio, providing the maximum benefit to students for most activities, would be somewhere between 5 and 10 students to 1 adult.

Resident outdoor education is a 24-hour-a-day job. Minimal staff involvement means that all persons will be on "active duty" at all times. Some teachers and support staff can handle this rigorous schedule, and some cannot. It pays to be selective! Additional assistance can be found among student teachers, retired or unemployed teachers in the community, community and high school service organizations, and parent volunteers. Parents need preparation and clarification of their role as assistants or teachers—not as "parents." Support staff members that are involved in the resident program need to know exactly what is expected of them so that they can function comfortably within the parameters of the program. Communication is a key factor in the planning process. Assumptions about leaders and leadership roles should not be made; each role should be carefully defined and understood by all leaders. Extra adults can be of tremendous help with supervision and teaching. Parents are an excellent vehicle for public relations. Their active involvement and positive feedback to administrators and other parents in the community can keep a program alive!

Step Five ◆ Identify the Type of Program and Services Needed at the Outdoor Center

Consideration should be given to the following items:

FOOD SERVICE

To what extent will the children and school staff be involved with the preparation, serving, and cleanup of meals? Are kitchen services provided by the staff at the center? Some centers are set up for offering complete food service, and, because of state health department codes, children are not allowed to work in the kitchen. Food preparation and cleanup take a lot of time, and a major portion of the day is spent with these activities, when children and school staff members undertake the tasks themselves.

It may be possible to involve the children in preparing snacks as one of their activities. Perhaps one meal can be prepared over a campfire. The amount of time spent with this aspect of the program will, of course, depend upon the objectives and major focus of the resident program.

LODGING

Outdoor education centers can be rustic (tents or unheated cabins) or quite modern (carpeted dormitories with indoor plumbing). Accommodations for a comfortable night's rest, including the types of beds that are available and accessibility to washrooms, are important considerations. Costs will vary, depending on facilities, so comparisons should be made before the final selection.

MEETING AREAS

Although most of the activities will be done in the outdoors, it may be helpful to have large indoor meeting areas or some sort of shelter for crafts, dancing, group games, or other large group activities. Depending on the location, it may be comforting to know that there is a place from which to "escape the elements" in extreme cases, while still continuing to offer involvement activities. A campfire area is usually desirable.

STAFF

The teachers and support staff from the school that will be part of the resident program should be chosen wisely. Are they qualified to handle all types of activities? An in-service workshop may be necessary to provide them with the necessary skills for working comfortably in the outdoors. Staff will be needed to manage academic activities, recreational activities, and overnight supervision. What types of services are provided by the camp staff? Usually the resident camp staff members have special talents that can be an asset to a program. Parents, community volunteers, and other helpers should be considered carefully in terms of their talents and capabilities for benefiting the program.

Some resident facilities provide a nurse, and some do not. Often a member of the community who is a nurse or the school nurse will accompany the school group and assume responsibility for dispensing medication, keeping records, and administering first aid.

ACADEMIC PROGRAM ACTIVITIES, MATERIALS, AND EQUIPMENT

Learning activities that are suited to the natural features of a resident site should be investigated. A list of equipment that is available at the center should be made to determine what equipment will have to be brought from the school. A budget should be prepared, and the materials, supplies, and equipment that need to be purchased should be prioritized.

SURVEY VARIOUS SITES

Several sites that might be appropriate for the program should be checked. A list of resident outdoor education facilities within a certain radius of the community will be helpful. The person in charge of a facility will furnish information about it. Several bus companies should be checked for rates for transportation (especially for extra charges for traveling out-of-state).

Things to do when visiting and surveying various sites:

- Arrange a convenient time for a visit. As many teachers as possible that will be a part of the program should be involved in the site-selection process.
- Have a list of questions concerning services, facilities, costs, staff assistance, etc.
- Allow enough time at each center for the person in charge to fully explain what that center has to offer. If it is possible, observe a program in action, and sample a meal. Get to know the resident staff members, and note their qualifications.
- Take good notes. If you are visiting several sites in one day, it is important for later consideration to record details of each center.

The following outline may serve as a checklist of factors to be considered at each center:

A. Physical Facilities

1. Dormitories/cabins and washroom facilities. Linens provided?
2. Meeting areas:
    - a. indoor
    - b. outdoor
3. Kitchen/dining room facilities:
    - a. seating arrangements
    - b. number of tables and chairs
    - c. provisions for family-style meals; cafeteria-style or other arrangements; types of meals—sample menu; snacks provided?
    - d. other services provided

B. Study Sites

1. Farm
2. Quarry
3. Field
4. Forest
5. Prairie
6. Cemetery
7. Lake, pond, stream, or ocean
8. Marsh or bog
9. Landscape formation
10. Gully or ravine
11. Historic landmark
12. Other (log cabin, canyon, river, etc.)

C. Resident Center Staff

1. Director of outdoor education.
2. Program staff:
    - a. number
    - b. qualifications and experience
    - c. areas of expertise

D. Cost per Person

1. What is included in the cost? Meals? Snacks? Lodging? Services? Staff assistance? Nurse?
2. How is payment made? Down payment required? What are

contractual arrangements concerning number of participants? Cancellation in emergency, etc.?

E. Insurance Coverage

F. Other Factors

1. In-service for teachers. Parent presentation. Planning sessions with teachers.
2. Responsibilities of teachers and support staff.
3. Minimum/maximum number of participants.
4. Things to bring.

Preparing for a "first-time" resident outdoor education experience is no small task. However, if teachers and administrators tackle the endeavor one step at a time, carefully considering each item, the complexities of preparing for the experience can be minimized. Thoughtful planning and thorough preparation will reap the rewards of a successful outdoor venture.

SPECIFIC PLANNING PROCEDURES

Planning for the resident experience can be undertaken in a variety of ways, depending on who has the major responsibility for the planning. Often the individual classroom teacher handles all the arrangements for a class. If more than one class from a school participates, the teachers or an administrator from the school may work either through a district outdoor education coordinator or directly with the director of the resident site to plan the program.

Three models of organization for planning, the teacher-student, the school administrator–teacher, and the administrator–resident center staff planned programs, are described here as key examples of how a resident program might be initiated.

Teacher-Student Planned Programs

In this pattern, the major effort is made by the classroom teacher and the students, with the assistance of parents, administrators, and resource persons. If the most significant program of study is to be designed, and if the maximum achievement of educational goals is to be obtained, two key factors in the planning are:

- Classes should develop their own program of learning activities so that their experiences in the outdoor education center complement the curriculum at school.
- Teachers for each class should coordinate the entire sequence—organization, implementation, and evaluation—for their own classes.

PREPARATION WITH PARENTS

The teacher should give some thought to the general educational goals and identify some curriculum objectives toward which the group will work. Early in the planning stages, an orientation meeting with parents should be held to acquaint them with the purposes and scope of the resident outdoor education experience. Parents need to understand at the beginning stages how the safety and health of the students will be maintained during such an experience away from home. The financial share for parents, if any, should be explained, along with the overall cost of the program. Although it is desirable for the entire class to participate in the resident program, children cannot be required to go. In cases of insufficient funds, the school administrator should make every effort to insure that every youngster who is able can participate. Parents should realize that student cooperation is essential, and any student whose behavior causes disruption or a threat to the overall success of the program may not be invited to go along. Parents should be alerted to the fact that they may be asked to drive to the center to pick up their child in case of an accident or illness or in the case of misconduct.

Parent support can be invaluable! Parents want "special" programs for their children; they are willing, in most cases, to support them. Fund raising by parents can offset some of the financial burden, and often parents can be a help at the center by offering supervision and supportive services. For example, a parent who is a nurse or doctor may volunteer to accompany the group and handle the dispensing of medication and care for minor accidents or illness.

At the planning meeting, parents should be allowed ample time to raise questions about the program in order to have the clearest understanding possible. This is especially important if this is the initial experience in outdoor education for the school. If the outdoor education center is not far from the school, an open house at the facility will prove effective.

Preparation with Students

The educational benefits of the resident outdoor education program begin long before the students reach the site. Even though specialists and resident staff might make the arrangements in some programs, much is to be gained by the class that develops its own plans in a logical manner. These planning sessions are handled by the teacher as a part of the regular school day in the classroom.

Some of the items that might be dealt with in a planning meeting with students are:

- Reasons for going to the outdoor education center.
- The kinds of things that can be done there that cannot be done in the classroom.
- Learning through experience.
- Getting to know each other better.
- How living experiences at the center will be different from living at home.
- Possible schedules and program ideas.
- Facilities and location.
- Organizing cabin groups.
- Planning study groups.
- Equipment needs.
- Clothing needs for a particular time of the year.
- Ideas for evening program activities.

If the students will be planning and preparing their own meals, a discussion of the following topics would be helpful.

- Nutritional value of foods and what makes a balanced diet.
- Nutritional foods that are well liked by youngsters.
- Religious beliefs concerning foods.

- Cost of food. How much will have to be purchased, and where to buy it.
- Food storage facilities at the center.
- Preparation time and equipment for cooking.
- Possibility of allergy problems with certain foods.
- Evening snacks.

When plans are developed in this manner, it is impossible to predict the many "teachable moments" that may arise. All areas of the curriculum will likely be touched upon without the labels of history, language arts, mathematics, and science.

Curriculum consultants or specialists might assist the children with their planning and organizing. The music teacher might help with the preparation of evening programs. The recreation or physical education specialist could teach the children to call their own square dances and assist with their planning of a skit night or a talent show. Other community resource persons, including parents, might become involved in preparing children for their experience.

The resident center may have a director or staff member who works with teachers in planning and preparation. This person may make recommendations for activities based upon the features of the resident site. Whenever possible, the planned program should utilize the unique features of the center. However, activities should be consistent with the objectives of the program.

Experiencing a few short trips to an outdoor area with the class before going to the resident center will prove beneficial to the program. Unless children have had some prior experiences in "seeing," "listening," "tasting," "touching," and "smelling," two or three days might pass at the outdoor education center before they really begin to focus upon the object of their study.

The results of student planning are often startling in that they approach what an adult group might plan. The following represents the result of discussions centered around the topic "What we want to learn and hope to do."

Flowers and Seeds

- Go on a hike to find a variety of specimens.
- Sketch different flowers in their habitats.

- Learn some common names and some scientific names for flowers.
- Examine various plants, and see where seed formation occurs.
- Draw several types of seed containers.
- Categorize seeds in terms of how they travel.
- Prepare a site, and plant some seeds.
- Write poetry about flowers and/or seeds.

Water Plants and Animals

- Watch for animals, and find animal signs. Identify them.
- Make plaster casts of animal tracks.
- Compare the types of water plants found around the water and in the water. Draw them.
- Look for frog eggs and tadpoles.
- Collect pond life in enamel pans. Observe, using a hand lens. Draw different types. Identify. Return pond life to water.

Measurement

- Measure an acre.
- Estimate the size of large objects, such as a building. Measure it.
- Estimate your walking speed.
- Learn to use a compass for finding direction. Measure your pace.
- Plot a map of the area.

Trees

- Determine the age of a tree by counting annual rings.
- Observe five different trees. Compare bark. Compare leaves. Describe branching patterns. Describe leaf patterns.
- Make spatter prints, using leaves.

- Specify uses for trees. Discuss how humans are dependent on trees.
- Write a poem about a tree.
- Estimate the height of a tree, using the shadow method of measurement to determine its height.

Rocks and Fossils

- Make a collection of different types of rocks found at the center.
- Look for fossils in sedimentary rocks.
- Find out about the geologic history of the area.

Geology and Landscape Formation

- Find evidence of erosion.
- Find streams, and describe natural run-off patterns.
- Find springs.
- Determine how the movement of water through an area has affected it.
- Trace a stream. Follow meanders. Find oxbows.
- Describe the landscape. Discover what the major plant types are. Minor plant types. Compare sizes of plants. Determine uses for the land.
- Describe the types of soil found in the area. Examine soil particles, and classify according to size.
- Determine where certain types of plants grow best.

Environmental Education

- Describe the impact humans have had on the area.
- Determine how the plants and animals in the area are dependent on each other for survival.
- Decide what types of conservation measures could improve the site. Plan a conservation project.

These are just some of the many concepts that can be emphasized in study. Even if all of the ideas generated by children cannot be dealt with in the resident program, the "brainstorming" technique provides the students an opportunity to realize the tremendous variety of topics that can be studied in the outdoors.

The teacher-student planning model is usually implemented when only a few classes from one or two schools take part in a program and when there is no centrally coordinated program at a higher level, that is, districtwide or countywide. The site is leased or rented for the required number of weeks, and the classroom teacher assumes responsibility for completing the arrangements for transportation, medical care, finances, and program activities. The teacher is usually the on-site instructor, but the resident center may have qualified staff that will assist with teaching. A classroom group can be divided into smaller working groups with the classroom teacher taking a small group and the resident staff taking the other(s). Groups can be rotated between staff for variety in leadership, or groups can remain with the same adult leader throughout the experience.

In reaching toward the ideal program, which closely relates the school program with the resident experience, it is desirable that the classroom teachers are involved in the teaching-learning process and in the social-emotional experiences of students as much as possible.

School Administrator–Teacher Planned Programs

A second model for dealing with basic arrangements of a resident program is one in which the details of securing the site, menu planning, transportation, program plans, and such are made by an administrator who usually serves as the on-site director or coordinator of outdoor education for the school district. A preplanned calendar of activities and events is usually arranged by the coordinator, but individual teachers may request certain themes or topics, relevant to their classes, to be included in the program. In this pattern, teachers work closely with the director in handling instructional responsibilities in the field. Often a support staff of qualified instructors will assist in instructional responsibilities, thus the teachers and the support staff work in teams with groups of students.

The amount of planning and preparation by the teachers with the students and parents is dependent upon how much the individual teachers choose to take upon themselves. Often the coordinator will conduct one orientation meeting for the parents of all the children who might attend the resident center in a session. The classroom teacher will often conduct presite activities that can be done in the classroom or on the school grounds in preparation for the resident experience.

Administrator–Resident Center Staff Planned Programs

Many programs, consisting of several school districts, a countywide system, or a regional area, operate for the entire school year and are administered so that all the program details and arrangements are handled by a centralized resident staff. Very few modifications, if any, are allowed in the program of learning experiences. The classroom teacher is usually an observer, with occasional opportunities to meet with the students for planning or discussion.

A teachers' guide, or manual, outlines the responsibilities of the outdoor education staff, parents, principals, and classroom teachers in great detail. Suggested presite and postsite activities are recommended to the teacher. Each individual school may sponsor a special training and orientation weekend in the fall for all the classroom teachers who will be attending the outdoor center that year. Actually, for any of the organizational models, inservice preparation for teachers, including familiarity with the facilities and study sites, is an asset.

Several classes might attend the center at the same time and participate in the program of activities on a staggered basis. The children are sometimes mixed with those from other classes or schools in study teams, eating groups, or cabin groups, depending on the objectives of the resident program. With large numbers of children at the site at any one time, the daily routine tends to become highly structured and routinized.

SCHEDULING

Once program objectives and activities are determined, it is necessary to formulate a basic outline or time frame under which the program will operate. Students and teachers are used to operating in blocks of time, and organizing activities in this way is an efficient method of utilizing the short time at the resident center. Activities may be scheduled for 1-hour, 1½-hour, or 2-hour blocks of time, depending on the number of activities included in the program, the flexibility of the instructors, and the number of student groups involved. The daily schedule on page 141 provides a model for the two-night/three-day program.

IMPLEMENTATION

The resident outdoor education program is an extension of the classroom into the outdoors in order to achieve certain curriculum objectives in an effective and efficient manner. Specific activities will be used as the means for accomplishing the various objectives.

The degree to which goals of a program are achieved is dependent on how the plans are executed rather than on what has been planned. Creation of an atmosphere that is sparked with enthusiasm, excitement, and wonder is essential in providing the student with the opportunity to be "caught up" in the spirit of learning through direct experience.

Following are some examples of specific goals that might be selected by a teacher involving students in a resident program.

To Complement the Subject-matter Areas and the Objectives of Education Through Direct Experience

The broad objective of education, to provide opportunities for the development of individuals to their fullest potential, is fostered through the objectives and activities of the outdoor education program. Exposure to new methods and materials for learning enlightens children and expands their world. Firsthand contact with subject matter found in the science and social studies texts provides a direct relationship between the curriculum and the real world, thus providing the referents that learners need to conceptualize.

To Develop Self-realization

The resident situation presents an opportunity for individuals to venture on their own in a community, without competition from parents or from standards of the adult world. Although the resident outdoor experience cannot guarantee a gift of self or self-discovery of individuality and worth, it certainly can create a climate within which self-discovery might progress.

Day/Time	Group Name or Number	Group Name or Number	Group Name or Number	Group Name or Number
MONDAY 10:30-12:00	Arrival; Getting Settled & Unpacking; Orientation to Center			
12:00-1:00	**LUNCH**			
1:00-2:30	Field Study	Farm Tour	Orienteering	Lang. Arts & Art
2:30-4:00		Mapping	Tree Study	Quarry Study
4:00-5:30	Meetings with Classroom Teachers; Log Writing			
5:30-6:30	**SUPPER**			
6:30-8:30	Evening Program			
8:30-9:00	Campfire & Snacks			
TUESDAY 7:30-8:00	Rise & Shine; Dorm Cleanup			
8:00-9:00	**BREAKFAST**			
9:00-10:30	Farm Tour	Field Study	Lang. Arts & Art	Orienteering
10:30-12:00	Mapping		Quarry Study	Tree Study
12:00-1:00	**LUNCH**			
1:00-2:30	Orienteering	Lang. Arts & Art	Field Study	Farm Tour
2:30-4:00	Tree Study	Quarry Study		Mapping
4:00-5:30	Meetings with Classroom Teachers; Log Writing			
5:30-6:30	**SUPPER**			
6:30-8:30	Evening Program			
8:30-9:00	Campfire & Snacks			
WEDNESDAY 7:30-8:00	Rise & Shine; Dorm Cleanup; Packing			
8:00-9:00	**BREAKFAST**			
9:00-10:30	Lang. Arts & Art	Orienteering	Farm Tour	Field Study
10:30-12:00	Quarry Study	Tree Study	Mapping	
12:00-1:00	**LUNCH AND DEPARTURE**			

To Develop Understanding and Appreciation of the Outdoors

The entire program is geared in this direction. Understanding is gained from firsthand experience with the natural world, and appreciation is developed from within, as a result of the many contacts with nature. One advantage of the teaching/learning situation in the outdoors is the proximity to what is being studied. The learner becomes involved through use of the senses and develops a "oneness" with the natural environment.

To Develop a Sense of Physical Well-being

Principles of nutrition and personal hygiene are part of the resident program. The students are actively involved in the program which keeps them alert and interested. Hiking, climbing, discovering, and generally participating keep the students physically active and mentally alert.

To Develop Desirable Human Relationships and Sound Social Attitudes and Values

Children working together, playing together, and living together are the basic format of the resident experience. From classroom planning to follow-up evaluation, the students are totally involved with one another, both mentally and physically. The numerous interactions between small groups over several days make the resident center a human-relations "laboratory." The children live and work together in a miniature community, concerned with whatever duties and responsibilities are part of their program. In a setting such as this, it is possible for the individual to develop deeper insights into the reasons for accepting and sharing responsibility, for getting along with others, and for group living and planning.

CLASSROOM FOLLOW-UP

The resident outdoor education experience also extends back to the regular classroom. Reference is often made to the "pre-," "at," and "post-" portions of the outdoor education program, with the most emphasis and effort being placed upon the "at" period.

The day's experiences are "relived" during conversation at mealtime.

In a well integrated program, such a division is convenient for descriptive purposes only. Leaving out or de-emphasizing any one of the phases of the program decreases the potential value of the total experience. The portion of the experience executed at the resident center is complementary to the planning, organizing, follow-up, and evaluation that take place. For this reason, it is highly desirable for the classroom teacher to coordinate the entire sequence. The teacher is the only person who shares all stages of the program with the children, is acquainted with their backgrounds, and is familiar with the total curriculum for the year. Viewed in this manner, the outdoor education center and the field staff, the specialists, and the equipment are resources available to the teacher in order to achieve the goals and objectives in the most effective and efficient manner possible.

Upon returning to the classroom, the children should review their original goals and the activities carried out at the resident site before deciding the next step. Some activities that may be selected for follow-up are:

- Classifying and identifying any specimens brought back for a classroom collection. ♦ NOTE: Only collections of rocks and fossils, fallen leaves, weeds, seeds, and nonliving "interesting finds" are suggested. Collecting can be destructive and can interfere with the beauty, ecology, and quality of life in an area. Children should be encouraged to appreciate natural things in their own environment; natural objects should be left for others to enjoy.

- Researching "unanswered questions" about the natural environment.
- Preparing an exhibit showing log books, art projects, fossils, language arts efforts, and other items to display at a parent meeting. Present a program for students that will be involved in the resident program the following year.
- Writing thank-you letters to staff and school personnel that helped with the program.
- Writing an article for the local newspaper.
- Evaluating the effectiveness of the program in terms of the original goals.
- Determining what should be done differently, if the children were to go again.

SPECIAL RESIDENT OUTDOOR EDUCATION PROJECTS

Some interesting variations of the resident outdoor experience have been tried in an attempt to meet the concerns of youth with special needs. For example, programs have been designed for dropouts, for physically and mentally handicapped students, for gifted students, and for students with low motivation. In both of the following examples, decentralized camping and mobile or traveling camping, the basic values and purposes of a resident program are applied.

Decentralized Camping

This summer program took youth from "low-income families" to a wilderness area for a primitive, decentralized camping program. A rustic setting was chosen by design in order to expose the students to a "new world" and to serve as a catalyst in fostering social interaction. The counselors were regular teachers, from the school, and student teachers who had participated in a special leadership training workshop. The co-ed group was divided into three living units of 12 children and 3 adults. Two of the adults were teachers who would stay with the living group for the entire 10-day session. The third adult was the site leader who remained at the campsite while the groups rotated through on a round-robin basis every third day. In this manner, each unit participated in outdoor learning experiences at three different sites, under the supervision of their teacher-counselors and site-specialist.

The purpose of the project was to accomplish the following goals, by providing a resident outdoor experience that contained deep personal involvement with the essentials of the group-living process:

- To broaden the experimental and educational horizons of youth.
- To promote healthier human relations.
- To increase the motivation to want to learn.
- To improve communication skills.
- To develop appreciation of the beauty and order of our natural environment.
- To enable teachers to work more effectively with culturally disadvantaged youth.

Various activities were selected as experiences that might enable the children to "open up" their sensory apparatus and "tune in" on the many unknowns of the outdoor world. An attempt was made to capitalize upon the curiosity "of the moment" and "on-the-spot" interests. The leaders used the sensory- and problem-solving approach as much as possible.

The three sites chosen were Tepee, located in a mountain meadow near a stream; Volcano Lake, located on the shore of a beautiful crater-type lake, where the students had to pack in their supplies to reach the site; and Dugan's Pond, a shallow lake with considerable animal life nearby. The major learning activities at each site follow.

TEPEE SITE

- Gold panning.
- Nature hikes.

- Visit to a gold mine.
- Fishing.
- Archery.
- Geology study.
- Star study.
- Use of a telescope.

VOLCANO LAKE

- Campcraft.
- Rock study.
- Map and compass a cross-country hike.
- Bird study.
- Fishing and rafting.
- Swimming.
- Exploration of an old gold mine road and the remains of an old mine and stamp mill.

DUGAN'S POND

- Hike to Sierra Buttes (the highest mountain in the area, 8,587 feet).
- Visit the U.S. Forest Service fire lookout tower.
- Swimming.
- Plant study.
- Animal homes.
- Storytelling.
- Star study.
- Horseback riding.

Mobile or Travel Camping

One alternative to the decentralized camping program is the mobile or traveling outdoor school. The overnight stays may take place at campsites (county, state, or national parks), or indoor accommodations (schools, YMCAs, missions) may be utilized.

One junior high school planned a 1,000-mile trip that took the students through a portion of their state, which was rich in history, geology, and natural beauty. The travel unit consisted of 20 youngsters and 5 leaders in two minibuses and a pickup truck. The following itinerary, although localized to California, can be duplicated in other states with appropriate changes.

- ♦ First Day ♦ Starting point to Sutter's Fort (Sacramento) and Marshall Gold Discovery Site State Park (Coloma).
- ♦ Second Day ♦ Coloma to Sierra Buttes recreation area (Tahoe National Forest), following the "Golden Chain," State Highway 49. Stop and explore gold mining towns of Auburn, Grass Valley, Downieville. Swim in the Yuba River.
- ♦ Third to Fifth Day ♦ Sierra Buttes recreation area. Visit Plumas-Eureka State Park (museum on early California history, stamp mill plus mining equipment and relics). Explore Frazer Falls, Mill's Peak Fire Lookout, and Lincoln Valley. Swimming at Sand Pond. Boating and fishing at the Sardine Lakes.
- ♦ Sixth Day ♦ Sierra Buttes recreation area to Fallen Leaf Lake, with stops at Donner Party campsite and Donner State Park. Journey along western shore of Lake Tahoe.
- ♦ Seventh to Ninth Day ♦ Fallen Leaf Lake campground. Visit Lake Tahoe, Rainbow Trail, U.S. Forest Service Stream Profile Chamber, Washoe Trail, Geology Trail, Angola Lookout. Attend evening campfires at Lake Tahoe amphitheater. Boatrides on Lake Tahoe and Echo Lakes. Horseback riding at stables. Swimming in lakes.
- ♦ Tenth Day ♦ Return home via Echo Pass.

It can be readily seen that the above program offers countless opportunities for learning experiences related to history, geography, conservation, geology, ecology, natural history, mathematics, and recreation.

An urban high school sponsored an American Southwestern Study Tour during the spring vacation period. This group, consisting of 32 students and 8 leaders, journeyed 2500 miles in a bus through the Southwest. The areas visited included the Mojave Desert, Death Valley, Lake Mead, Zion National Park, Lake Powell, and Glen Canyon National Park. The collective goals included an intensive investigation of the geology, biology, and ecology of the region. The natural history of the Southwest was explored by bus, by boat, and on foot.

SUMMARY

Variety and diversity best describe the types of resident outdoor education programs that are conducted in North America today. Many factors determine the exact pattern of organization for a particular program of which personnel, site, finances, philosophy, and local school laws are just a few.

The key factor, in spite of the wide range of practices, is that the development of a resident outdoor education program can add a new dimension to the total educational program for a child. Classroom teachers, by becoming directly involved, may relate to their students in new ways, enabling them to vitalize teaching and learning both inside and outside the classroom.

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CHAPTER 6

Evaluation Procedures in Outdoor Education

MOST EDUCATIONAL VENTURES are considered incomplete until some type of evaluation procedure has been followed. Outdoor education experiences are no exception. Each activity should be scrutinized in order to determine the degree of success in accomplishing the desired learning goals and objectives. As education enters the era of accountability, teachers will be expected to substantiate various gains, if the programs are to be continued.

PERFORMANCE OBJECTIVES

The evaluation process begins when the general goals and specific learning objectives are identified. If they are clearly stated at the outset, the task of selecting appropriate experiences and activities is simplified, and the framework for deciding the level of achievement is constructed. Many educators believe that the most effective way of stating specific learning objectives is behaviorally; that is, a statement of what the learner will do in order to demonstrate achievement of the objective. The following examples contain the ingredients of sound performance objectives:

- Given a number of different soil samples the learner should, with 80 percent accuracy, be able to describe and record in chart form, the characteristics of each sample, including color, texture, pH, and ability to hold moisture.

- Following a study-plot exercise, the student should be able to construct, with 90 percent accuracy, a food-chain diagram illustrating the animal-plant and animal-animal relationships within that particular plot.
- Following a study hike in a forest community, each hiker should be able to express feelings of awareness by one of the following means: in writing (haiku or cinquain); in painting (water colors, ink, or oils); in a mosaic (using native materials).
- After a soil-study lesson, the participant should be able to express (orally or in writing) feelings about the effect that humans have upon that particular soil environment.
- Upon the completion of an orientation lesson in the use of a magnetic compass, 80 percent of the class members should be able to locate the hidden treasure at the end of a destination unknown hike.
- After a field trip to a tree farm, lumber mill, or forest, each person should be able to estimate, with 90 percent accuracy, the number of board feet in selected trees, by utilizing a Merritt Rule and Biltmore Stick.

It is a relatively simple task for the classroom teacher to determine whether or not a student has successfully met the requirements of these objectives. A closer inspection of the above examples will reveal that there are two for each of the three domains for educational objectives—cognitive, affective, and psychomotor skill. The final plan of evaluation should not only include items from all three major domains but also should represent the various levels of depth. One should keep in mind, however, that some behavioral phenomena still cannot be measured on a teacher-made instrument. Most fall in the affective domain. For example, How does one measure the *thrill* of discovery? An *appreciation* of a sunset? A *sense of self-confidence*, after conquering a difficult situation?

LEARNING PROCESSES

Recently, teachers have also been placing greater importance upon *learning how to learn*—the basic processes of learning—including:

- Observation
- Inference
- Communication
- Classification
- Using Numbers
- Measurement
- Time/Space Relationship
- Prediction

The American Association for the Advancement of Science has also prepared a list of learning processes that, in addition to the above, includes:

- Formulating Hypotheses
- Experimenting
- Interpreting

These categories have become the central focus of some evaluation attempts, whereby performance objectives are developed around one or more of the above processes. For example, after a study-plot encounter, each student should be able to:

- Identify the outstanding characteristics of any plants and animals found in the plot area ◆ Observation.
- Place into groups the various living and nonliving objects discovered in the plot ◆ Classification.
- Describe what the plot will look like in five years, if it is allowed to exist in its present condition ◆ Prediction.

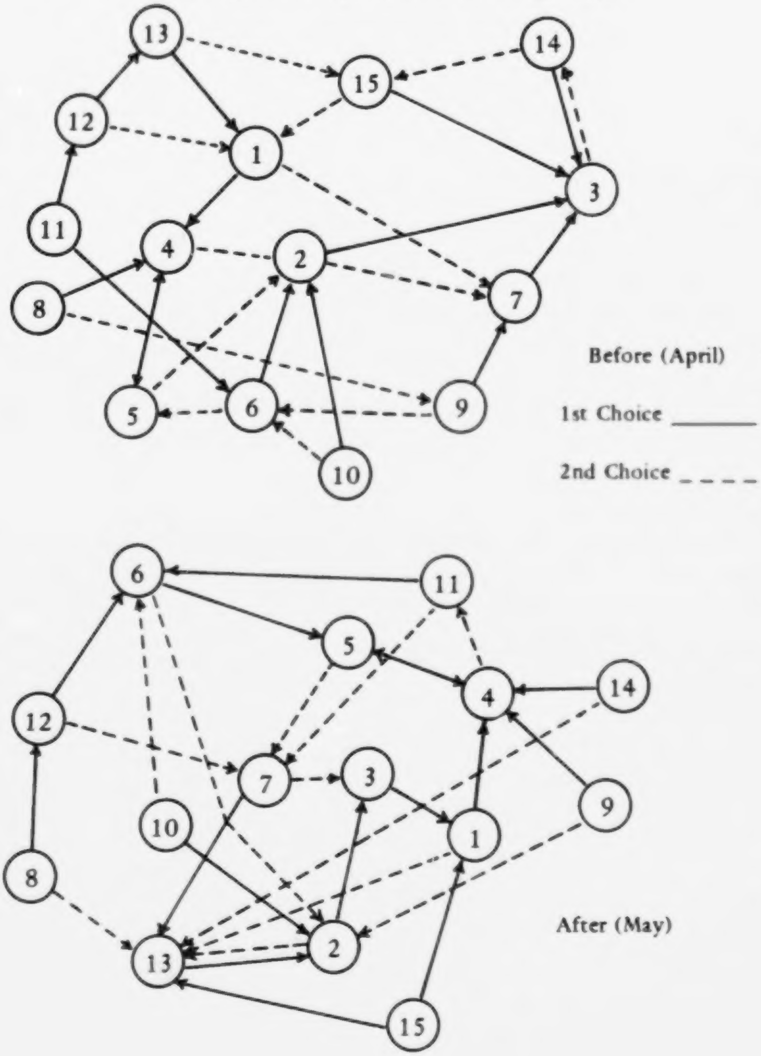
EVALUATION TOOLS

In order to obtain the data or evidence that will aid the evaluator in making a total assessment of an outdoor lesson or program, some of the following tools or instruments may prove helpful:

- Sociogram ◆ During evaluation discussions, the teacher might ask, "If we were to go to the resident outdoor school again, who would you want in your living group?" The follow-up sociogram resulting from these selections could then be compared with the initial diagram in order to detect changing patterns within the class. ♦ Note: It is obvious that the boys' acceptance of classmate number 13 changed greatly. Wouldn't it be interesting to know why this change took place? This type of insight might result if the teacher and staff used the next evaluation technique.

- Anecdotal Records ♦ This form of recording direct observations of children in a variety of situations lends itself to detecting recurring patterns of behavior. Further analysis might reveal "what makes Johnny tick" and the kinds of circumstances that threaten him or provide support. The anecdotes should be concise and objective accounts of what was said or done by each individual. Such data might provide valuable insight into a child's self-concept, value system, or attitudes.
- Teacher-made Tests ♦ Essay and objective questions may be utilized by the teacher in an effort to find out how much information or conceptual understanding was gained by the student. Situational type questions can also be developed that will indicate the student's ability to perform various learning processes, for example, predicting, classifying, etc.
- Interviews ♦ An extremely beneficial technique for evaluation is the personal interview with the individual. Although it may be time consuming, it may prove to be highly significant in obtaining insights. The teacher might use data from the sociogram or anecdotal records as the basis for some questions during the interview.
- Daily Logs ♦ The logs kept by the children or the stories written following their return to the classroom might cast additional light on other benefits gained from a resident outdoor school program. Items mentioned in these writings might be useful in the individual interviews.
- Creative Projects ♦ For those students who may not express themselves well verbally, much can be learned from their creative expressions, such as sketches, paintings, sculptures, and musical compositions. Photographic stories, by the children, are an alternative art form that allows insights through the "eye of the beholder." Creative expressions frequently project those experiences that were most significant and meaningful to the creator.

Sociogram of Boys' Choices for Cabin Mates



Before (April)

After (May)

13
14
15
12
1
3
11
4
2
8
7
5
6
9
10
1st Choice ________
2nd Choice _ _ _ _
6
11
5
4
14
12
7
3
10
9
1
8
13
2
15

- **Questionnaires** ♦ Although this information is subjective, questionnaire responses may be categorized to reveal significant gains and accomplishments of the program. Separate forms should be designed for use with pupils, parents, and teachers.

Following are a pupil evaluation, a parent evaluation, and a teacher evaluation of a resident outdoor school program.

Sample Pupil Evaluation of A Resident Outdoor School Program

1. Was it worthwhile to go? Yes _____ No _____
2. What did you learn at the outdoor school?
    - What a dicot and a monocot are.
    - How to measure height with a pencil or stick.
    - How to measure across a river.
    - How big an acre is.
    - New vocabulary words.
    - How to make a terrarium.
    - How to identify rocks and fossils.
    - How to be independent.
    - About stars and constellations.
    - The parts of a flower.
    - Difference between lizards and salamanders.
    - How old a fossil might be.
    - About the three stages of forest development.
    - How to identify birds.
    - How to tell poison ivy from other plants.
3. What did you enjoy most? Why?
    - Cabin life, because it was fun to sleep and eat with classmates.
    - Stargazing, because I learned new constellations.
    - Bird hike, because I could see birds in their natural habitats.
    - Fossil hunt, because I like to see what they are made of.

- Flower hike, because we got to see flowers in the place where they live.

4. List any new interests you have or any changes you plan to make in the way you do things because of the outdoor school experience.
    - Make my bed more often.
    - I am more interested in small animals.
    - I like to stargaze.
    - I'd like to learn more about trees.
    - I'm interested in rocks and fossils.
    - I'm more interested in microscopic life.
    - I found out I was fat, so now I am on a diet.

Sample Parent Evaluation of a Resident Outdoor School Program

A. Did this experience make a difference in your child?

1. List any new interests your child has shown.
    - General nature (plants, animals, rocks, stars).
    - Care of house.
    - Etiquette at table.
    - Going to summer camp.
    - Goes outside more instead of watching T.V.
2. List any changes in the way your child does things or in the way he or she carries on the daily routine.
    - Willing to help at home.
    - More cheerful.
    - Seems more mature.
    - More independent. Does things without being told.
    - Willing to assume more responsibility.
    - Thinks ahead in planning duties for next day.
    - Neater in care of room and personal items.
    - Willing to try different types of food.

3. List any evidence of changes in feelings of your child toward classmates or teacher.
    - Feels closer to group as a whole.
    - More sensitive to approval of classmates than before.
    - Greater regard for many other classmates.
    - More appreciation of friendship.
    - Greater realization of the "human side" of teacher and parent.
    - Grownups have fun and comradeship as much as children.

B. Do you think the resident outdoor school was a worthwhile activity? Why? Yes ______ No ______ I don't know ______

- Cooperation—carrying out planned activities.
- Eagerness and enthusiasm of the total project.
- More aware of self as a separate, independent individual.
- Appreciation of the wonder of the "outside world."
- Understands how to get along with more than just a few friends.
- Knowledge gained from study hikes.
- Physical fitness from various activities.
- Demands of responsibility and self-reliance.
- Manners improved.

C. If we should plan another outdoor school program, what changes would you suggest?

- Try to get week to cost less.
- Nice to have one full week—seven days.

Sample Teacher Evaluation of the Resident Outdoor School

A. Did the resident outdoor school experience make a difference in your attitudes or philosophy?

1. List some facts you learned, or new ideas and thoughts that came to you, as a result of this program.

- I learned how to get along with the children, and, in turn, I feel that they learned how to get along with each other.
- Children are so eager to learn. The teacher does not have to know everything; the children do not expect it. I think I learned as much subject matter as the children did. Each time I went on a study hike, I saw millions of things that I hadn't seen before.
- One of the teachers made me realize, as he did the children, that everything in nature is related and necessary, if life is to continue.

2. List any new interests you have or any changes you plan to make in the way you do things that will influence your career as a teacher.

   - Some of the field trips I hope to be able to take my pupils on are:
     - Into the woods to look for flowers and small animals.
     - To a zoo, if one is near the school.
     - Stargazing parties at the children's homes.

3. List any changes in feelings toward any of the children or toward any of the teachers that you can attribute to this experience.

   - Some of the children who were shy and quiet in the classroom excelled at the outdoor school. Some of the more aggressive children, on the other hand, appeared more quiet away from the regular classroom situation.
   - My most outstanding changes were toward a certain boy and a certain girl. I was about to give up on the idea of getting along with them, when, at the outdoor school, they both seemed to accept me, and they have been very cordial ever since.

B. List instances in which you observed or participated in practical applications of principles of learning.

1. I noticed that the children learned more by going out on hikes and actually getting specimens than by just reading about them. They seem to get more from doing something

they enjoy doing. They were more eager to learn in the more relaxed atmosphere of the outdoor school than by just studying in the classroom.

2. With the proper motivation, the children see a need to use books and available material without being forced or told to do so.

C. List instances when you have observed what you believe to be changes in a child's behavior which were attributable to the outdoor school experience.

   1. The children who were very quiet in the classroom, or seemed disinterested in school, suddenly came to life. It seemed that they couldn't get enough information about the subject they were interested in.
   2. If a child found a rock, no matter how many rocks of the same kind had already been found, that particular rock was very special. It was prized as though it were gold and the only rock of its kind in the world.

D. What changes would you suggest if we were to plan an outdoor education program such as this again?

   1. Have a longer outdoor school period. Five days is good for the children, but it just skims the top of the subjects studied and does not allow sufficient time for depth.
   2. Try to obtain more reference books on plants written on the children's level.

E. List anything you have learned or any change in your part that has not been indicated by the above questions.

   1. I couldn't help thinking what a wonderful experience it was for all of us. We were living in a different environment which was completely new to most of us. Here we each had a purpose. Our purpose was to actually see and learn more about the things we have read about in books.
   2. The outdoor school experience is invaluable. The children seem to learn so much, and they enjoy it, too. They get so

interested in what they are doing that you begin to wonder if these are the same children you have in the classroom.

3. This was one of the most profitable experiences that I have ever had. I tied together what I have been learning in my college classes. The children found out that learning is fun and that you don't need a book in order to learn; you can learn from your environment. Even as small and seemingly insignificant as it is, we can still learn many things from the ant.

4. In the outdoor school environment, the children saw their teachers in a completely different light. They saw that teachers were human and just as interested in the subjects to be studied as they were. Both were learning together.

TEACHING TECHNIQUES

The utilization of a questioning strategy has been identified as the "heart" of the exploratory or discovery approach to learning. The skillful development of an effective questioning technique is not "accidental"; it can be learned and perfected. The National Park Service has created a framework that should enable an outdoor teacher to formulate more precise questions that, in turn, will cause the learner to think about and to achieve a better understanding of the environment.

Recall Questions

Recall questions are formulated to cause students to gather data based upon past observations, feelings, or experiences. At this level, some of the mental processes that might be used are:

- Counting
- Describing
- Identifying
- Matching
- Naming
- Observing
- Recalling
- Selecting

The following questions are examples that might elicit recall thinking responses:

How many green plants do you see in your study plot?	Counting
How did it feel when you touched the bark?	Describing
What is the name of that bird?	Identifying/naming
What do you see the beaver doing now?	Observing
Can you find the mica in the granite?	Selecting

Process Questions

Process questions are designed to cause learners to draw some relationships among the data recalled through thinking processes, such as:

- Analyzing
- Classifying
- Comparing
- Experimenting
- Explaining
- Grouping
- Inferring
- Sequencing

The following are examples of questions that teachers might use to involve students at the process level of thinking:

Can you place the living and nonliving objects into groups?	Classifying
What difference, if any, is there between the texture of the bark on these two trees?	Comparing
How does the speed of the water affect the path of the river?	Explaining

What do you think would feed on this animal?	Inferring
How can you arrange the minerals so that they are in order of their hardness?	Sequencing

Application Questions

Application questions are asked in order to cause students to go beyond the concepts they have developed or the data they have gathered and to use them in totally new situations. The thinking processes generated by application questions are:

- Applying a principle
- Evaluating
- Extrapolating
- Generalizing
- Hypothesizing
- Judging
- Predicting
- Speculating
- Theorizing

Sample questions that cause students to become involved in the application level of thinking are as follows:

Based upon what we have already learned about adaptions of plants, can you see other examples of plant adaption in the areas?	Applying a principle
Among the solutions to the energy problem, which do you think will be the most successful?	Evaluating
What do you think would have happened to the Indians of the desert if they had had all the water they could have used?	Hypothesizing

If the population of the planet Earth continues to grow at the current rate, what do you think life in the year 2000 will be like?	Predicting
What would life be like if there were no environmental regulations?	Speculating

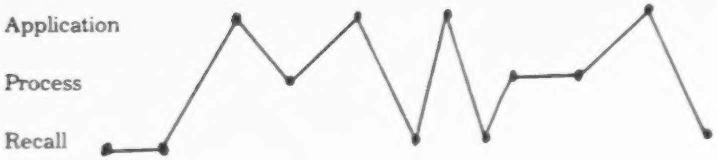
Using the preceding categories, teachers may analyze their own outdoor teaching styles. For example, with a portable tape recorder, they can record their "verbalizations" for 30-45 minutes during an outdoor lesson or on a trail walk. Then, they can listen to the tape and tally the number of questions asked and the number of other types of statements.

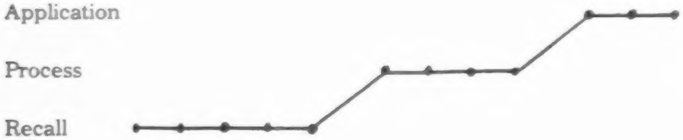
- What percentage of the statements made were questions?
- Among the questions asked, how many (percentage) were recall? Process? Application?
- Did the type(s) of questions asked coincide with the original goals and purposes for the lesson or experience?
- Did the use of questions follow any sequence?

Outdoor teachers and interpreters generally accept the notion that the participant will gain more understanding and meaning from the experience when questions are asked in a gradual sequence from recall, to process, to application. Teachers, in the outdoor setting, will experience difficulty, if they present their questions in a random manner by switching back and forth between process, application, and recall levels of thinking. The National Park Service has found that:

> . . . each time an interpreter changes the level of thinking of a group of visitors, some members of the group drop out of the interaction. They no longer remain involved or contribute further to the discussion; if they do, their responses are bizarre or unrelated to the topic.

If teachers plot their level of questioning, they might see patterns that look like this:


Random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The implications are clear. If the students are to derive maximum knowledge of understanding from the outdoor lesson, then the teachers should:

- Begin with recall questions. Allow the learners time to make observations and gather information through the use of their senses.
- After sufficient information has been collected, increase the thinking level by asking process-level questions.
- Raise the thinking level still higher (if appropriate for the lesson) toward the end of experience, by posing application questions.

There are other techniques that might be used to aid in the evaluation of the questioning technique. A more sophisticated ladder of thinking levels is described in *Helping Students Think and Value* by Jack Fraenkel. If teachers wish to analyze their verbal behavior according to categories such as teacher-initiated talk, teacher response, pupil response, pupil initiated talk, and others, the Verbal Interaction Category System, based upon the Flanders System of Interaction Analysis, is recommended.

SUMMARY

If the quality of outdoor education programs is to improve, then it behooves outdoor educators to establish a process that continually evaluates the outcomes of their programs and the teaching styles of their staff. Various tools and techniques are available that will aid in determining the degree to which various learning objectives have been achieved and that will enable leaders to assess their teaching effectiveness.

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CHAPTER 7

What Does Research Tell the Outdoor Educator?

THE GROWTH of outdoor education in the United States, over the past five decades, has been paralleled by a gradually growing body of information derived from research studies. Two publications from the ERIC Center for Science, Mathematics, and Environmental Education at The Ohio State University summarized the research (up to 1976) that pertains to environmental education and to school camp programs. The highlights of these reviews indicated:

- Of the studies dealing with school camping, most were concerned with collecting data for improving existing programs. Results generally indicated that the programs were useful and helpful, but such contentions were based almost entirely on subjective data. A stronger focus on objective analysis is needed.
- Resident outdoor education programs do not always result in positive environmental attitudinal changes for all students.

Although the research data, to date, are inconclusive, there are sufficient positive findings to encourage educators to continue the sponsorship of the unique and innovative learning experience that can take place in the outdoors. A selected number of investigations, including program evaluation, subject-matter areas/cognitive domain, socialization/affective domain, environmental education, wilderness/adventure education, teacher education, and teaching strategy, that contain findings of significance to the outdoor educator are described briefly here.

PROGRAM EVALUATION

Sharp (1947) was involved in an experiment undertaken by the Board of Education of the City of New York, in cooperation with Life Camps. A small-scale experimental design was developed, using fifth- and seventh-grade pupils in a three-week resident outdoor education program. One of the major questions that were explored in this research project was, "Is educational camping an effective medium for meeting the objectives of education?"

A wide variety of tests and other measurement techniques were employed on a before-and-after basis that provided objective, semiobjective, and clinical data. The results revealed:

1. Gains: Gains from initial to final testing that were statistically significant favored the experimental group in two areas: Interest Inventory (7th grade) and vocabulary (5th grade).
2. Initial Testing: On the initial testing, prior to camp, the experimental group scored higher in each of the tests and Interest Inventory in both the fifth and the seventh grades. Four of the differences were statistically significant: Interest Inventory (7th); science and health education, nature study, and Interest Inventory (5th).
3. Final Testing: On the final testing, after camp, the experimental group scored higher on 8 of the 10 comparisons. Five differences, all favoring the experimental group, were statistically significant: Interest Inventory (7th); nature study, vocabulary, arithmetic, and Interest Inventory (5th).
4. Language Arts: The experimental group displayed gains over the control group in written expression in interest value, style, vocabulary, and types of activities described.
5. Artistic Representation: Experimental group drawings indicated more enriched concepts, increased visual impressions, and some improvement in artistic ability.
6. "Guess Who": The results were essentially that the camping experience did not change the role of outstanding children, such as leaders or showoffs.

7. Counselor Records: The most striking result was that many insights about the children were attained by the staff within the very brief camping period.

Although there were several limitations to this study, the implications from the data were that the experimental groups benefited in some ways that were not possible in the regular "indoor" school program.

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Cragg (1952) attempted to determine the development of sixth-grade campers, as compared to noncampers, and to appraise the educational achievements of the camp program in terms of the educational objectives identified by the school. Cragg's general conclusions were:

I. In spite of the shortness of the resident outdoor school period (one week), some definite contributions to the educational development of the children were made.

   A. Intellectual Development: The camp group showed greater improvement in nature study than those who remained in the classroom.

   B. Physical Health: The camp maintains an environment that is healthful for the majority of the children.

   C. Social Relationships

      1. Boys demonstrated more stability in their friendship patterns and seemed to maintain more continuity in leadership than girls.
      2. Certain children maintain leadership roles, and certain children remain social isolates, regardless of their environment.

   D. Emotional Development: The camping experience produced a strong emotional impact in the joy and enthusiasm aroused in the children.

II. The experience holds elements of uniqueness common to many of the children, but the reaction to the experience is varied, individualistic, and enthusiastic. Experiences at camp which hold significance for children tend to retain this significance over a period of time.

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Hollenbeck (1958) obtained the following results in a study related to the educational outcomes of the school camp:

1. Art: The jury which compared the drawings of the outdoors made by the children before and after the camp experience found that:
   a. There was no significant change in the number of items illustrated, but the activities pictured in the postcamp drawings included more on science topics.
   b. Postcamp drawings depicted different species of trees, canyons, and forested mountains to a greater extent than the precamp drawings.
   c. Precamp drawings showed the use of adult techniques and symbols and a diffused effort to depict the outdoors. Postcamp drawings were more detailed and realistic.
   d. Postcamp drawings disclosed a better understanding of the kinds of life found in the outdoors and keener powers of observation of the children.
2. Interest: An analysis of the precamp and postcamp scores on the interest inventory revealed that:
   a. Fifth-grade children made significant gains in science interests.
   b. Fifth-grade boys showed gains in all eight areas of the inventory: art, music, social studies, active play, quiet play, manual arts, home arts, and science.

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Becker (1977) designed an experimental study to determine if there was any change in attitudes of sixth-grade students toward environmental issues, as a result of participation in a resident outdoor education program, in addition to the classroom experience. Her study was limited to 360 students selected in a stratified random sample from the public schools of Santa Cruz County, California.

Based upon statistical evidence, the following conclusions were drawn:

1. The resident outdoor school experience, as a supplement to the regular classroom instruction, is more effective in improving attitudes toward environmental concerns than the regular classroom instruction, without the resident outdoor education experience in the areas of conservation of natural resources and human impact on the environment.
2. There were no significant differences shown in the concept areas of environment, interdependence, or pollution.

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Huntley (1979) replicated, to the degree possible, the 1947 research study conducted by L. B. Sharp for the New York City Board of Education. This study utilized a sample of 94 sixth graders from the Alpine School District, American Fork, Utah. This experimental study collected data pertaining to nature, mathematics, science, and vocabulary. Although all groups showed a gain in mean scores for these areas, no statistically significant differences were achieved.

SUBJECT-MATTER AREAS/COGNITIVE DOMAIN

Pike (1954) developed a science test that could be used to evaluate the science program in an outdoor school. The test was given to 207 sixth-grade pupils two weeks before camp and again the week after they returned to school. The most significant gains were made in the general area of knowledge of plant relationships and rocks and minerals. The poorest showings were made in the areas of conservation concepts and general camping knowledge and skills.

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Hoeksema (1964) attempted to answer the question How does the use of outdoor teaching methods influence achievement in arithmetic? The study was limited to two sixth-grade classes that served as the control and experimental groups.

After a period of four school weeks, statistical analysis of the gains, from pretest to posttest, revealed that each group achieved significant gains in both reasoning and computation. The difference between the two groups, and in favor of the experimental group, was significant only in computation skills. However, when the total mean gain differences were analyzed (reasoning scores plus computation scores), the experimental group established a gain that was highly significant.

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McNamara (1971) investigated the research questions: Will there be any significant difference in overall achievement, critical thinking, preference for the outdoors, and the individual concepts between the group experiencing laboratory investigations in an outdoor environment and the group pursuing these activities in an indoor environment? Will any differences exist between I.Q. group levels?

The eighth- and ninth-grade students in this study used the ESCP textbook, the only difference being that the experimental group experienced the laboratory investigations outdoors rather than indoors. The following conclusions were drawn:

1. Significant differences between treatments may be present, if individual concepts rather than overall achievement are evaluated.
2. Learning in the outdoors is enhanced, if the concepts are related directly to the environment.
3. Critical thinking and preference for the outdoors were changed favorably for the experimental group.
4. Curriculum planners should consider the outdoor environment for low-ability groups, when designing a curriculum.

SOCIALIZATION/AFFECTIVE DOMAIN

Cole (1957) designed a study that had a twofold purpose: (1) to determine whether a work-learn camp for potential high school dropouts had greater holding power than the regular school program for a comparable group of potential school leavers who remained in school; and (2) to find out to what extent students might improve in their home, school, and social adjustments, following the camp experience. The experiment involved three sample groups:

- Potential dropouts who participated in the work-learn camp experience.
- Potential dropouts who remained in school.
- A well adjusted group that also remained in school.

The first group spent more than half the year in the work-learn camp.

The major finding was improved attitudes toward school. At the beginning of the camp experience, the majority of the camper group was openly hostile to school and everyone connected with it. After camp, over half the campers indicated they planned, or had the desire, to complete their education, and 40 percent said that they appreciated school more after their experience at camp. Classes were easier for 21 percent of the camper group, and the relationships between students and teachers had improved 46 percent. Peer relationships improved for 36 percent of the campers after their return from camp, and 93 percent of the campers indicated that they would repeat the experience.

Although fewer campers remained to graduate than members of the other two groups (camp groups = 32%; comparison group in school = 60%; well adjusted group in school = 97%), those who did apparently felt that the camp experience was responsible for their remaining in school to complete their education.

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Kranzer (1958) created an experimental design that would measure the effects (social, emotional, intellectual, physical, democratic group living) of a one-week resident outdoor school program for sixth graders.

He concluded, after obtaining data with Wood's "Behavior Preference Record," the "Haggerty-Olson-Wichman Behavior Rating Scale," and sociograms, that social and democratic behavioral changes take place more rapidly during a week of school camping than during a regular "indoor" school program. A slight improvement in critical thinking was made by low mental ability students. There was also an increase in the number of isolates in camp beyond what would normally be found in the classroom.

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Beker (1959) evaluated the effects of a school camping experience upon pupils' self-concepts and social relationships. He used the "Classroom Social Distance Scale" and a "Fifty-six Item Self-Concept Check List" as instruments on a before-and-after basis.

The findings indicated that members of the experimental group gained more positive feelings toward themselves after the outdoor school experience. These changes were also greater than those of the control group. Positive gains were also indicated in the area of social relationships of the experimental group. These social relationship patterns increased even more when measured again 10 weeks later.

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Stack (1960) tested fifth- and sixth-grade students from a lower-middle socioeconomic background before and after a one-week resident outdoor school experience in order to assess attitudes toward selected concepts of school, teachers, self, classmates, friends, and school camping. Some of her findings were:

1. There was a consistent change of attitude of both grades in a positive manner toward the homeroom teacher, subsequent to camp.
2. Boys changed more favorably in regard to the homeroom teacher than did girls, after camp.
3. There was an overall change in students in a more positive attitude toward school camping, subsequent to the experience.
4. Students considered getting better acquainted as one of the most important features of the experience.
5. There was an overall positive gain in relation to attitudes toward friends . . . with boys forming more friendships following camp than did girls.

The following conclusions were justified by Stack's study:

1. Despite its limited duration, greater freedom of choice of companions and an increase in the number of friendships formed characterized the school camp program.
2. The school camp experience provided unique opportunities for effecting social change, particularly where the problem of racial cleavage was a factor.
3. Although classmates of lowest sociometric rating received more recognition from classmates following camping, no appreciable improvement in the sociometric work companion ratings of neglectees and isolates was effected.
4. Both boys and girls regarded school more positively after camp, with widened friendship patterns exerting an influence from an improved emotional tone in the classroom.
5. The rapport between teachers and students was strengthened.
6. The educational camp, by its structure, increased the values of relationships and associations over those of "ego-concept."
7. For boys, particularly, school camping served as a new stimulus to rekindle interests in the important relationships regarding school, teachers, camping, self, and friends.

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Davidson (1965) measured changes in the social relationships and self-concepts of 60 fifth- and sixth-grade children who participated in two philosophically different camp programs. Thirty children were randomly assigned to encampment I (Adult-centered) which featured fixed schedules, inflexible programming, constrictive adult guidance, and a minimum of group interaction. The remaining 30 took part in encampment II (Child-centered) which encouraged individual initiative, group interaction, self-government, flexible programming, and a minimum of adult interference.

1. Changes in Self-concept: The more highly structured and constrictive encampment I showed more positive group shifts than did the less structured encampment II. Both encampments produced positive gains measured by a self-concept check list. What may be concluded from these data is not that one camp was better or worse than the

other camp, but that one camp produced certain changes in self-concepts that were not produced in the other camp.

2. Social Relationships: Encampment II had a higher proportion of changes in peer relationships than did encampment I. The data seem to indicate that school camping has a positive influence on the acceptance of classmates, regardless of the emphasis of the curriculum or the philosophical orientation of the camp. Slight differences favoring the less-structured encampment (Child-centered) were not found to be statistically significant over the more highly structured, adult-centered camp. However, it seems that encampment II exerted a more positive influence on children's peer relationships than did the adult-centered camp.

The school camp and its emphasis on cooperative endeavors and close harmony in work situations apparently produces an environment for decreasing the social distance between high- and low-status children. Observations indicated that low-status children were eagerly sought out at camp because of their willingness to work cooperatively in community group projects. Of course, it is possible to assume that these children were exploited by higher-status children, but even if the basic motive was exploitation, it turned to genuine regard for these low-status children who were so willing and eager to help.

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Fletcher (1973) investigated the differences in self-reliance, ability to cooperate in a group, and the transfer of positive values back to the classroom between economically disadvantaged and nondisadvantaged sixth graders attending a one-week outdoor school. A random sample of 100 pupils from the Toledo, Ohio, Public Schools were tested by three instruments: the "Nowicki-Strickland Locus of Control," the "All About Myself Scale," and a "Pre/Post Camp Pupil Questionnaire." After the resident program, Fletcher found that:

1. There was a significant difference between the disadvantaged and the nondisadvantaged pupils in their level of externality with regard to locus of control. The disadvantaged children reached the level of externality—after the

outdoor school week—that the advantaged pupils had at the beginning of the week.

2. The five-day outdoor school program had a significant effect toward helping pupils in both groups to become more self-confident and more self-reliant.
3. There was moderate transfer of positive values back to the classroom.
4. The students improved moderately in their ability to better cooperate with others.
5. Ninety-four percent of the students stated they enjoyed camp, wished they could have stayed longer, and wanted to return again.

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Acuff (1976) investigated the effect of an intercultural resident outdoor school experience on the anxieties of Anglo and black sixth-grade students, in two school districts in Southern California, through the use of a modified version of the children's "Manifest Anxiety Scale" with 226 subjects in an experimentally designed study, Acuff reached the following conclusions:

1. Black upper elementary students appear to experience substantially more general anxiety than do their Anglo peers.
2. The outdoor school experience contributes to the lowering of both general and intercultural anxiety among black and Anglo upper elementary students.
3. The outdoor education program had a more positive effect upon black students than Anglo students in the lessening of general anxiety.
4. There appears to be a slight positive correlation between general anxiety and intercultural anxiety in upper elementary black and Anglo students.

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D'Agostino (1980) conducted a research study to determine if an outdoor education program mitigates racial hostility and racial misunderstanding. This study involved black, white, and Puerto

Rican fifth-grade students from Newark, New Jersey. The experimental group attended an outdoor center that offered a success-oriented curriculum with a human-relations component. The control group's center did not offer this component. The "Cultural Attitude Scale" was utilized to measure racial attitudes.

The hypothesis that the exposure of the experimental group to a human-relations program component would reduce racial hostility and improve racial attitudes significantly was supported.

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Bateson (1981) observed that changes in student-teacher relationships have been stated as one of the many positive outcomes of a resident outdoor education program. His experimental study examined both the changes of students' perceptions of their teacher and the changes in teachers' perceptions of students. Using the "Teacher Pupil Relationship Inventory," students in the experimental group were found to have changed their perceptions of their teachers in a positive direction, when compared to students who had not experienced such a program.

Using the information required for Bales' *Interaction Process Analysis*, the teachers were found to have altered their perceptions of some individual students after the resident outdoor school experience. Also following the resident program, it was perceived that isolated students and groups within the classes were drawn into the main relationship networks of the classes.

ENVIRONMENTAL EDUCATION

Gross (1977) designed a study based upon the sensory and conceptual approach to the study of natural communities used in *Acclimatization*. The subjects were fifth- and sixth-grade students who were exposed to advance organizers related to concepts taught during a field trip to a wilderness woodland community. The fifth graders were tested one week following the special program, and the sixth graders were measured one year after treatment, with six instruments that were utilized on a pretest/posttest basis to measure change in perceptions, attitudes, and knowledge.

The results of this study indicated that:

1. Cognitive knowledge of woodlands, measured right after

treatment, was significantly greater than the pretest scores and the sixth-grade group tested one year after the experience.

2. Attitudes toward use/abuse of nature were significantly more positive immediately after and one year after the experience.
3. Student perceptions of woodland measures indicated a significantly greater affective orientation toward woodlands immediately after and one year after treatment.

Another portion of the study dealt with socioeconomic status and sex. No relationships could be inferred from the data relating to these variables.

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Werling (1979) developed a school/community model for the stewardship of school site and neighborhood outdoor laboratories. His research design also compared fourth- and fifth-grade classes that had environmental education experiences at these outdoor "classrooms" and indoors. The eight-week study was based upon the Science Curriculum Improvement Study (SCIS) conceptual framework, which was taught indoors, both with and without environmental education lectures. A third science group was taught outdoors, utilizing Outdoor Biology Instructional Strategies (OBIS) extensively. The study was conducted in order to determine what differences, if any, would exist among these three instructional modes and change in pupils' knowledge of selected ecological and environmental concepts, facts, and understandings. The following results were reported:

1. Pupils learned SCIS life science concepts indoors as well as outdoors.
2. The outdoor group gained significantly more environmental knowledge than either of the other two groups.
3. No difference was found between littering and stewardship day response behavior and knowledge of the environment.

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Andrews (1978) examined the relationships among the cognitive, affective, and behavioral domains in a six-week program of outdoor education activities that focused on ecological concepts. The study involved an accessible sample of 58 sixth-grade students and one teacher who experienced outdoor activities adapted from Outdoor Biology Instructional Strategies (OBIS). The study explored six questions and reported the following conclusions:

1. There was no apparent relationship between knowledge of ecological concepts and involvement in outdoor activities.
2. There was a significant relationship between participation in outdoor activities and attitudes toward the ecological concepts related to these activities.
3. There was a significant relationship between knowledge of ecological concepts and positive attitudinal changes.
4. There was a significant relationship between attitudes toward the ecological concepts stressed and classroom academic aptitude.
5. There was no apparent connection between sex and level of involvement in outdoor activities.
6. There was no relationship between socioeconomic level and attitude toward the ecological concepts.

Further data analysis indicated that those concepts concerned with direct observation of living things on a study site as well as mapping the site seemed to reflect the greatest positive attitudinal change.

WILDERNESS/ADVENTURE EDUCATION

MacDonald (1978) investigated the change in perception of self-concept of 28 urban high school students, after participation in a 12-day outdoor adventure experience. The study was designed to investigate the change in perception of self-confidence, self-awareness, and interpersonal relationships, as perceived by the participants.

The data gathered, in this within-group design, showed that the students made statistically significant changes in perception of self-concept in 10 of the 13 subvariables of the *Tennessee Self-Concept Scale: Clinical and Research Form* related to the three areas of self-concept examined. In addition, most of the program's activities were perceived to be enhancers of self-concept.

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Carter (1980) investigated the effects of a wilderness camping program upon "youth-at-risk." He compared the effects of two rehabilitation training programs for delinquent youths in Florida. This experimental study involved 120 male juvenile delinquents; one-half participated in the Eckerd Wilderness Camping Program and one-half attended the Florida Training Schools. This time-series designed study used the variables of school adjustment and court contacts as the basis of comparison.

Posttreatment data were collected at 6, 12, and 18 months following release of the two groups from their programs. Analysis of the data for the six-month period indicated that:

1. The Eckerd Wilderness Camping group had significantly fewer court contacts than the comparison group. No differences were noted in the seriousness of offenses committed.
2. The Eckerd group remained in school significantly longer than the comparison group.
3. The academic-achievement level attained by the Eckerd group was significantly higher than the control group.

During the second and third six-month posttreatment periods, there was no significant difference on court contacts; however, the Eckerd group did remain in school significantly longer than members of the control group. In addition, the academic-achievement level, as measured by grades attained by the Eckerd group, was significantly higher than that of the control group.

TEACHER EDUCATION

Hauserman (1963) compared the classroom performances of student teachers who had an orientation to outdoor education with those who did not have this orientation. He found that (1) the student-teacher group with an outdoor orientation revealed statistically greater behavioral pattern in the teaching-learning processes used; and (2) the Observation Schedule and Record

(OScAR), an observational instrument, showed a statistical difference in the emotional climate in the two groups. Student teachers with an outdoor orientation had consistently warmer, personal climates, with greater emphasis on individual activities.

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Heppel (1964) investigated the changes in college juniors after they had experienced five days at a resident outdoor school with children, by utilizing a questionnaire, daily logs, and an attitude scale of teaching values. Listed among her findings were:

1. Students who were majoring in elementary education generally reacted differently than did secondary majors.
2. All students experienced anxiety the first two days, but this gave way to confidence later in the week.
3. Attitudes expressed as changed included awareness to a different environment, appreciation for informal group activities, individual differences, insights into children's interest spans, cooperativeness, eagerness, and personality fluctuations.
4. Elementary education majors generally formed more positive attitudes toward a camping program than did the secondary majors.

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Chase (1969) designed a study (1) to identify changes in the attitudes of school administrators (Williamson County, Illinois) toward the usefulness of outdoor education in achieving academic goals and (2) to identify the changes in the attitudes of elementary teachers toward the usefulness of outdoor education in achievement of academic goals by their students.

The population tested was comprised of classroom teachers (165 public and private school teachers, K-6) and administrators employed during the 1967-68 academic year. The pretest results were utilized in designing a program that would encourage teachers to use outdoor education techniques, when appropriate. The basis for determining any significant changes in attitudes toward outdoor education was an instrument based upon the book *Teaching in the Outdoors* by Hammerman and Hammerman (1964). The philosophy developed in this book was assumed by the researcher to be the philosophy of outdoor education.

The following conclusions were drawn from the findings of the study:

1. Following exposure to an outdoor education program, there was less disparity between staffs of the districts in their attitude toward outdoor education.
2. All school staffs tested showed a significant increased belief in the Hammermans' attitude toward outdoor education.
3. The classroom teachers examined evidenced as acceptance of the Hammermans' philosophy that outdoor education in the schools is an integral part of the curriculum and involves an extension of the classroom to an outdoor laboratory.
4. The population of educators tested showed significant positive changes in attitude toward the use of outdoor education as a teaching aid in arithmetic, social studies, natural sciences, earth sciences, health–physical education–recreation, and arts-crafts-music.

The study also concluded that if teacher-training institutions would provide future teachers with outdoor education experiences, these teachers would be well received.

TEACHING STRATEGY

Corkery (1978) designed a study that explored what difference, if any, existed between the types of questions asked during class discussions by teachers in the classroom and the types of questions asked during class discussion by teachers in the outdoors. To accomplish this goal, he selected the Norvis Sander's system of classifying teacher questions.

Using a limited sample of 10 resident outdoor school teachers and 10 "indoor" science teachers at the sixth-grade level, Corkery analyzed the tapes of class discussions conducted by the two categories of teachers. From his study, he concluded:

1. Outdoor teachers were significantly younger, less formally educated, and less experienced than the classroom teachers.

2. Outdoor teachers asked a significantly higher proportion of cognitive questions than classroom teachers.
3. Outdoor teachers asked a significantly higher percentage of higher-cognitive questions than classroom teachers.

Corkery argues that site, rather than age, education, or experience, might have been the major factor in determining question level and cognitive question type. From this study, one could infer that Meredith Gall's hypothesis ". . . that teachers ask higher-cognitive questions about primary sources . . . than secondary sources . . ." is true.

IN CONCLUSION

Many claims have repeatedly been made for outdoor education since its inception some 50 years ago. Unfortunately, many of these claims have not been properly substantiated through valid research and evaluation procedures. Educators must constantly submit their propositions and hypotheses concerning outdoor education to the rigors of empirical research. Only after such critical evaluation can effective programs be developed that will be relevant for various groups of learners.

One indication that outdoor education has firmly established itself on the American educational scene is the fact that upwards of 700 doctoral dissertations have been completed on some facet of outdoor education. The contemporary school can no longer afford not to take advantage of the rich instructional resources that are so readily available "just beyond the chalkboard."

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